

MECOPTERA

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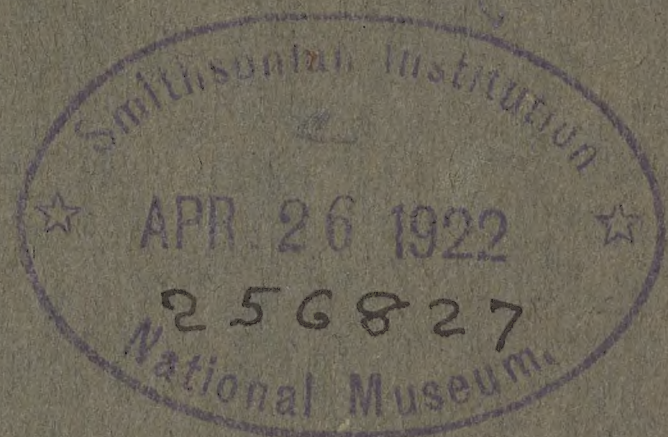
DU BARON

Edm. de Selys Longchamps



CATALOGUE

SYSTÉMATIQUE ET DESCRIPTIF



BRUXELLES

HAYEZ, Impr. des Académies

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SYSTÉMATIQUE ET DESCRIPTIF

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MECOPTERA

MONOGRAPHIC REVISION

BY

P. ESBEN-PETERSEN.

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All the figures are drawn or photographed by M. ESBEN-PETERSEN after the types studied by him in several Museums and private collections. They were executed by the Firm JEAN MALVAUX & Co, Brussels.

The names of the species which are not represented in the SELYS' collection are placed between [] and their descriptions are printed in small characters.



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PREFACE

This Monograph is especially based upon the examination of the material in the Selysian collection (Brussels Museum); but I have also had the good luck of looking over material from the following museums :

Tervueren (SCHOUTEDEN), Paris (BOUVIER and BERLAND), Leyden (VAN EECKE), London (GAHAN and MEADÈ-WALDO), Berlin (HEYMONS and STITZ), Deutsche Ent. Museum (SCHENKLING), Hamburg (KRAEPELIN and v. BRUNN), Vienna (HANDLIRSCH and ZERNY), Halle (TASCHENBERG), Copenhagen (LUNDBECK), Stockholm (SJÖSTEDT), Zürich (STANDFUSS), Tiflis (ZAITZEV), Cape Town (PÉRINGUEY) and Greifswald (MÜLLER).

Save the assistance rendered me by these Museums my work would have been very difficult, if not impossible, and I therefore must express my best thanks to the above named gentlemen. I am also much indebted to MIYAKÉ, NAKAHARA and NOHIRA, Tokyo; TILLYARD and FROGGATT, Sydney; LACROIX, Niort; LESTAGE, Brussels; BANKS, Cambridge, Mass.; KLAPÁLEK, Prague, and NAVAS, Zaragoza, for the loan and gift of material and for kind assistance in every way.

Thanks are also due to M. G. SEVERIN, who during my stay in Brussels 1912 (which stay was only rendered possible by aid from the Selysian Committee) displayed so great friendship and readiness to help, and later on also assisted me in every way in behalf of the publication.

As to the literature I have had great benefit from the Selysian library, but also Rrs, Rheinau, has given me friendly assistance in that way.

The Monograph was ready for print in August 1914, but on account of the war the publication was not possible until now. Nevertheless I have tried to include — as far as possible — all the contributions to the study and to the classification of the Mecoptera, published since 1914.

Silkeborg (Denmark), December the 1st 1920.

P. ESBEN-PETERSEN.

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Mecoptera COMSTOCK, A Manual for the Study of Insects, 1895.

Mecaptera PACKARD, Amer. Nat., XX, p. 888, 1886.

Panorpatae BRAUER, Sitzungber. Akad. Wien, XCI, pp. 237-413, 1885.

Mediocre and slender insects, terrestrial and carnivorous of habits.

Head small, front produced into a rostrum, which is deflected vertically. Eyes rather large. Three ocelli or none. Mouthparts biting. Mandibles narrow. Maxillary palpi 5-jointed. Labial palpi (*) 2-jointed. Prothorax short, transverse. Meso- and metathorax large. Abdomen slender, subcylindrical or somewhat depressed. First sternite reduced, covered by the produced hind border of the metathorax. Male with large claspers. Cerci present; in the male with one joint, in the female with two or more. Legs long and slender. Coxae large. Feet 5-jointed. Two pairs of wings, similar and membranous; scarcely somewhat coriaceous or absent. In repose they are carried longitudinally and nearly horizontally. Both pairs linear. Subcosta joins the costa or radius before apex and very often before pterostigma. Radius not forked (sometimes forked just before apex). Radial sector arises from the radius in the basal half of the wing and furcates several times. Media with several forks. Cubitus forking near the base. Anal space as a rule small and with a few anal veins. Venation in most cases open.

Larvae (as far as known) terrestrial, carnivorous. Pupa motionless.

(*) This not well-chosen term is used here, as well as by older authors, for the two prolongations from the distal end of the mentum (TILLYARD, *Proc. Linn. Soc. N. S. W.*, p. 290, 1917) names them proboscis.

TABLE OF FAMILIES.

1. Each tarsus with 1 claw and modified to raptorial use by folding down the terminal joint against the 4th. Legs very long and slender. *Bittacidae* ENDL.

Each tarsus with 2 claws; tarsus of usual shape; legs long and slender — 2.

2. Wings rudimentary; bristle-like (♂) or scale-like (♀).

Female with distinct and long ovipositor. Labial palpi short. *Boreidae* MAC LACHL.

Wings well developed. Female without any distinct ovipositor.
Labial palpi long — 3.

3. Wings long and slender and with a rather primitive and open venation. Rs arises at least one third from base. M furcates about in the middle of the wing. Body subcylindrical. *Panorpidae* STEPH.

Wings short and broad and with rather dense venation. Rs arises close to the base of the wing, and M furcates much before the middle of the wing. Body depressed — 4.

4. Venation of the wings very dense and irregular. Anal space of wings well developed. R and M coalesce at the base of the wing for about one fifth of its length. Ocelli present. *Notiothaumidae* MIHI

Venation of the wings more open and regular. Anal space of wings slightly developed. R and M do not coalesce at the base of the wings. Ocelli not present. *Meropidae* TILL.

FAM. PANORPIDAE.

Labial palpi long and 2-jointed. Abdomen subcylindrical, and the apical segments modified in the male; in the female sex the abdomen is somewhat pointed at the apex. No ovipositor. Legs slender. The tarsal joints of different length; but none of them modified; the apical one bears two claws. Wings well developed; long and slender and with a rather primitive and open venation. Rs arises about one third from base of the wing, and M forks almost in the middle of the wing. The anal veins simple and with very few cross veins. Costal area not very broad and with only a few cross veins.

The family is a rather wide-spread one.

TABLE OF SUBFAMILIES.

1. In the forewing Cu^1 does not fuse with the main-stem of M. *Panorpinae* ENDL.

In the forewing Cu^1 coalesces with the main-stem of M for a shorter or longer distance —

2.

2. In the forewing Cu^1 only touches the main-stem of M. R^1 , R^2 , R^3 , R^4 and R^5 are present. *Choristinae* MIHI

In the forewing Cu^1 and the main-stem of M coalesce for a longer distance. Only R^1 , R^{2+3} , R^4 and R^5 are present. Wings shorter, and the venation more open.

Nannochoristinae MIHI

SUBFAM. PANORPINAE.

The costal area in both pairs of wings narrow, with a stout basal cross vein and usually with an apical one. In the forewing the anterior branch of cubitus (Cu^1) does not fuse with the media (M) or with first anal vein (1A); but in the hindwing Cu^1 fuses for a short distance with M, and Cu^2 with 1A, also for a short distance. M furcates nearly in the middle of the forewing, and in the hindwing a little nearer to the base. The anal part of wings with two or three longitudinal veins and a few cross veins. Where M furcates a more or less clear spot (Thyridium) is found, and another is sometimes present at the furcation of the radial sector. In each of the two first cellules between the radial sector and M is found a small chitinous dot, and a similar one is present between the cubital branches near their origin.

In the male the hind margin of 9th ventral segment is prolonged into a long appendage (lower appendage), more or less deeply cleft in its apical part, and its branches differing in shape in the different species; dorsally the 9th segment is also prolonged into a subquadrate plate (upper appendage), the apical margin of which may be more or less incised or sometimes rounded. Between the dorsal and ventral prolongations are laterally inserted the 2-jointed claspers. The basal joints coalesce basally; the apical ones (the chelae) are moveable, pointed

towards their tips, curved and at the base with one or two blunt dents internally. Below the upper appendage the 10th segment is found, which is small and only slightly chitinized. At the apex of the 10th segment are placed two short 1-jointed cerci, the tip of which sometimes may

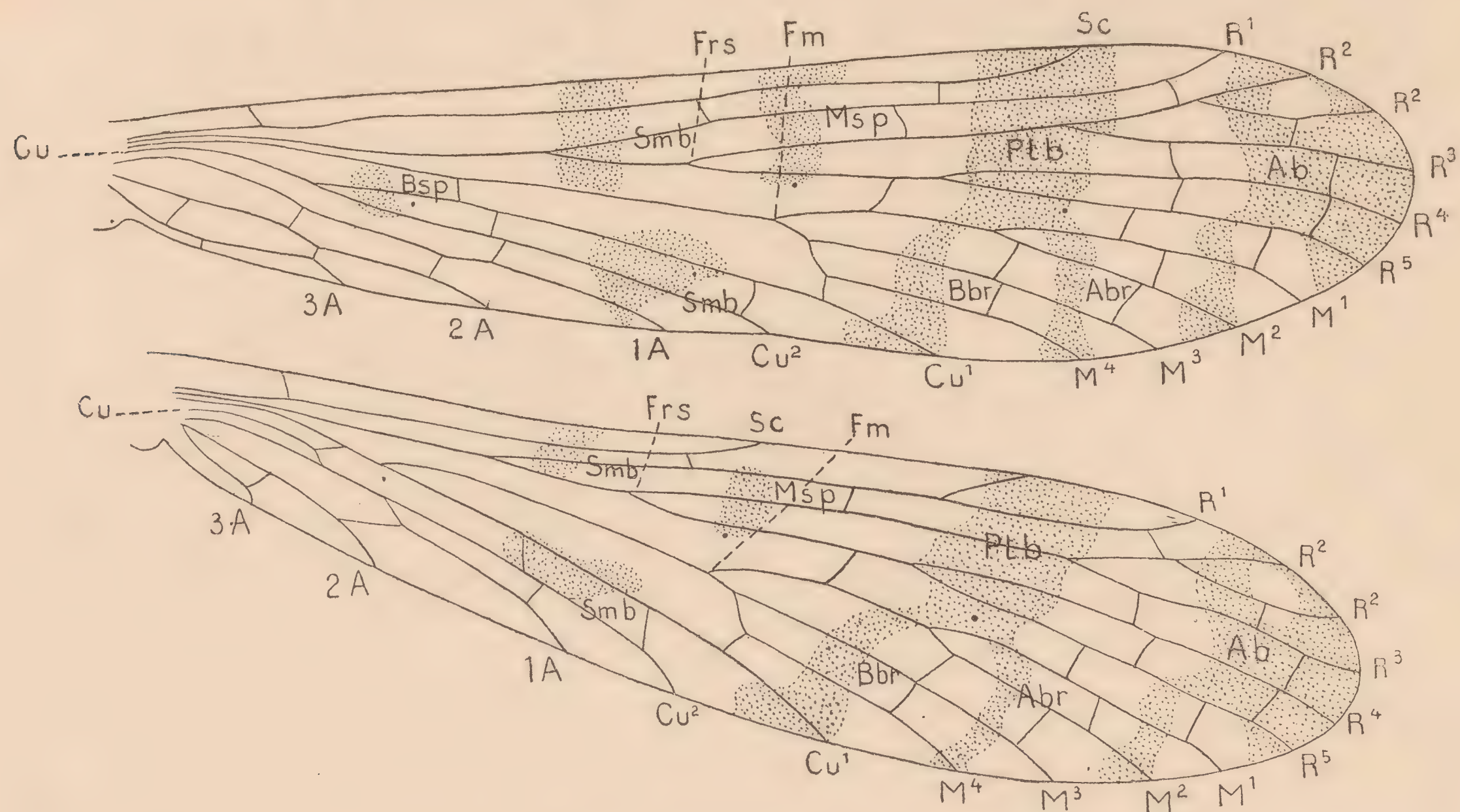


FIG. 1. — Fore- and hindwing of *Panorpa annexa* (Coll. Selys).

Sc = subcosta; R¹ = radius; R², R³, R⁴, R⁵ = branches of radial sector; M¹, M², M³, M⁴ = branches of media; Cu¹, Cu² = branches of cubitus; 1A, 2A, 3A = first, second and third anal vein. Frs = fork of radial sector; Fm = fork of media. Bsp = basal spot; Smb = submedian band; Msp = marginal spot; Ptb = pterostigmatal band; Bbr = basal branch of the pterostigmatal band; Abr = apical branch of the pterostigmatal band; Ab = apical band.

be seen from the dorsum below the upper appendage. Between the basal joints of the claspers is placed the longitudinally cleft penis, covered ventrally by the penis sheaths or titillators, which may be seen from below and offer good specific characters.

TABLE OF GENERA.

- | | |
|---|----------------------|
| 1. Claws not serrate internally. Rostrum rather short and somewhat conical. | <i>Panorpodes.</i> |
| Claws serrate internally. Rostrum long and slender | — 2. |
| 2. 1A joins the hind margin of the wing far beyond the origin of radial sector. Between 1A and 2A two cross veins in the forewing, one in the hindwing. | <i>Panorpa.</i> |
| 1A joins the hind margin before the origin of radial sector. Between 1A and 2A one cross vein in fore- and hindwing | — 3. |
| 3. Abdomen in the male as long as the wings or shorter; 7th and 8th segments only a little prolonged. | <i>Neopanorpa.</i> |
| Abdomen in the male much longer than the wings; 7th and 8th and sometimes also 9th segment much prolonged. | <i>Leptopanorpa.</i> |

Genus **PANORPA** Linné.

LINNÉ, Syst. nat., X, p. 551 (1758). — KLUG, Abh. Königl. Akad. Wiss. Berl., p. 88 (1836). — BURMEISTER, Handb. Ent., II, p. 956 (1839). — RAMBUR, Hist. nat. Ins. Névr., p. 328 (1842). — WESTWOOD, Trans. Ent. Soc. London, IV, pp. 184-197 (1846). — LOEW, Linn. entom., III, pp. 363-375, t. 4 et 5 (1848). — BRAUER et LÖW, Neuropt. austr., p. 35 (1857). — BRAUER, Verh. zool.-bot. Ges., Bd. XIII, pp. 307-324, t. 13 (1863). — Ibid., Bd. XXI, p. 109 (1871). — MAC LACHLAN, Trans. Ent. Soc. London, p. 209 (1868). — Klapálek, Rozp. České Akad. Cisare Frantis. Josefa, pp. 1-26, t. 1 et 2 (1896). — FELT, New-York State Ent., Rep. X, pp. 463-480, t. 3 et 4 (1896). — Mc CLENDON, Entom. News, p. 121, fig. 14 (1906). — STITZ, Zool. Jahrb., Bd. 26, p. 537-564, t. 28 et 29 (1908). — Mjöberg, Ent. Tidskr., p. 160 (1909). — ENDERLEIN, Zool. Anz., Bd. XXXV, p. 389 (1910). — MIYAKÉ, Journ. Coll. Agric. Tokyo, IV, p. 137 (1912). — Ibid., Journ. Coll. Agr. Imp. Univ. Tokyo, IV (1913). — BANKS, Trans. Am. Ent. Soc., p. 232 (1913).

Aulops ENDERLEIN, Zool. Anz., Bd. XXXV, p. 390 (1910).

Estenalla NAVAS, Revue Russe d'Ent., XII, p. 356 (1912).

Rostrum long and slender. Claws serrate internally. In some species the hind border of 3th abdominal segment in the male is produced into a broad and short flap. 6th, 7th and 8th abdominal segments in the male more or less modified. Sc joins the costa before or in the pterostigmatal area. 1A joins the hind margin far beyond the origin of radial sector. Three anal veins. Between 1A and 2A two cross veins in the forewing, one in the hindwing. R^2 as a rule forked in R^{2a} and R^{2b} . In specimens of *Klugi*, *terminata*, *punctata* and *immaculata* R^2 is often unforked; in *communis*, *Lewisii* and others R^{2a} is sometimes also forked. Wings rather broad, more or less marked with bands and spots.

The genus *Aulops* Endl. based upon the presence of the short Sc in the forewing, can not hold good. The length of Sc is liable to vary. In some species it joins the costa in the middle of the wing, in others it reaches almost the pterostigma, and in a great number it joins the margin in the pterostigmatal area; but its length varies also in specimens of the same species, and even in the same specimen. I have specimens before me, in which the Sc joins the costa far before pterostigma in one forewing, and joins the costa in the pterostigmatal area in the other forewing. The length of Sc may be of some value as a specific character only.

The genus *Estenalla* NAVAS likewise can not hold good, as it is similar to *Panorpa* in every respect.

The genus *Panorpa* contains a great number of species, spread over the Northern hemisphere.

Type : *P. communis* L.

Eurasiatic species.

These species may be divided into two divisions as to the length of Sc. The division, in which the Sc in the forewing as a rule joins the costa in the pterostigmatal area, contains the greater number of species. In this division we have the *communis*-group (*communis*, *nigrirostris*, *rufostigma*, *hybrida*, *clavigera*, *germanica* and *deceptor*) with more or less marked wings, Ptb, Bbr, Abr, Ab and Smb as a rule present or distinctly indicated by spots; the *cognata*-group

(*cognata*, *meridionalis*, *annexa* and *Ghilianii*), in which the hind border of 6th abdominal segment in the male is emarginated laterally, and Ptb as a rule well defined; the *picta*-group (*picta* and *Selysi*) with all the bands of the wings broad and well defined; the *connexa*-group (*connexa* and *similis*) with the wedge-shaped Ptb and the incomplete Bbr, Abr and Ab; the *Davidi*-group (*Davidi* and *sibirica*), in which Ptb and Bbr form an oblique, rather broad band, Abr absent, Ab incomplete; the *stigmalis*-group (*stigmalis* and *concolor*) with long, slender and immaculate wings; the two species *guttata* and *arcuata* each form a group.

In the second division, in which the Sc as a rule joins the costa before the pterostigma, we have the *alpina*-group (*alpina* and *pura*), in which the markings of the wings are not well defined, and the terminal segment of the male short and stout, almost globular; the two species *caucasica* and *dicerus* each form a group.

P. communis Linné (fig. 2).

Panorpa communis LINNÉ, Syst. nat., X, p. 551 (1758); Faun. Suec., II, p. 384 (1761); Syst. nat., XII, p. 915 (1767). — LEACH, Zool. Miscell., II, p. 98 (1815). — CURTIS, Brit. Ent., pl. 696 (1834). — STEPHENS, Ill., VI, p. 52 (1836). — RAMBUR, Hist. Nat. Ins. Névr., p. 328 (1842). — BRAUER et LÖW, Neur. Austr., p. 36, fig. 17 (1857). — HAGEN, Ent. Zeit. Stett., Bd 19, p. 133 (1858) (Siberia). — STEIN, Berl. Ent. Zeitschr., p. 414 (1863) (Greece). — MAC LACHLAN, Trans. Ent. Soc. London, p. 214, pl. XI, fig. 6, 6a (1868) (England). — ID., Ibid., pp. 59-70, pl. IV, fig. 3a, 3b (1869). — ID., Soc. Ent. Belg., p. 9 (sep.) (1881) (Belgium). — ID., Rev. d'Ent., p. 7 (sep.) (1884) (Vosges). — WALLENGREN, Svenska Vet. Akad. Handl., IX, p. 69 (1871) (Sweden). — MEYER-DÜR, Mitth. Schweiz. ent. Ges., IV, p. 359 (1874) (Switzerland). — SCHOCH, Neuropt. Helvetiae. Planip., p. 11 (1885) (Switzerland). — SCHOYEN, Christ Vidensk. Forhandl., p. 12 (sep.) (1887) (Norway). — ROSTOCK, Neuropt. Germanica, p. 116 (1888) (Germany). — ALBARDA, Cat. rais. syn. Névropt., p. 112 (1889) (Holland). — DZIEDZIELEWICZ, Sprawozd. Kom. fizyogr., p. 26 (1894) (Galicia). — HEYDEN, Bericht Senckenb. Naturf. Ges. Frankf. a. M., p. 112 (1896). — Klapálek, Rozp. České Akad. Cisare Frantis. Josefa, p. 10, t. 1, fig. 1; t. 2, fig. 1 (1896). — MORTON, Ent. Monthl. Mag., p. 30 (1901) (Norway). — STROBL, Mitt. naturw. Ver. Steierm., p. 241 (1905) (Steiermark). — ESBEN-PETERSEN, Ent. Medd., p. 48 (1906) (Denmark). — Bull. Soc. Scienc. de Bucarest, p. 60 (1910) (Roumania). — KEMPNY, Bull. Soc. Scienc. de Bucarest, p. 673 (1906) (Roumania). — MONTANDON, Ibid., p. 678 (1906). — MJÖBERG, Ent. Tidskr., p. 161, fig. 46 et 48 (1909) (Sweden). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 185 (1910) (Japan). — Ibid., IV, pl. 31, fig. 11, p. 340 (1913). — LUCAS, The Entomologist, p. 186, pl. IV, fig. 1 (1910) (England). — Ibid., p. 307 (1913). — Ibid., p. 88 (1917). — Ibid., p. 57, fig. 1-2 (1919). — LACROIX, Insecta, p. 88, fig. 1-9 (1913) (France). — Ibid., p. 361 et sq., fig. 1-2 (1913). — Ibid., p. 92, fig. 1-6 (1914).

Panorpa communis var. *diffinis* MAC LACHLAN, Trans. Ent. Soc. London, p. 63 (1869).

Panorpa vulgaris IMHOFF et LABRAM, Insekten der Schweiz, p. 321 (1845). — MEYER-DÜR, Mitth. Schweiz. ent. Ges., p. 359 (1874). — MAC LACHLAN, Soc. Ent. Belg., p. 9 (sep.) (1881) (Belgium). — ID., Rev. d'Entom., p. 8 (sep.) (1884) (Vosges). — SCHOCH, Neuropt. Helvetiae. Planip., p. 11 (1885). — ALBARDA, Cat. rais. syn. Névropt., p. 113 (1889) (Holland). — HEYDEN, Bericht Senckenb. Naturf. Ges. Frankf. a. M., p. 112 (1896).

Head blackish, sometimes brownish at the posterior and lateral margins; rostrum brownish. Maxillary palpi brownish with dark apical joint. Antennae blackish; basal joint brownish yellow; 2nd joint dark brown. Thorax blackish dorsally and with yellowish brown sides. Prothorax dorsally with yellowish hind margin, meso- and metathorax as a rule with a broad yellowish brown median band. Abdominal segments blackish brown with more or less distinct pale brown hind margins. In the ♂ the 6th segment is cylindrical, narrower at the apex, truncate; 7th and 8th conical, nearly of the same length, together a little longer than 6th, reddish brown; 8th with somewhat obliquely truncated apex above. The 9th segment reddish brown. The branches of lower appendage cylindrical, approximating at the base and tip. The upper appendage with a deep incision. Titillators broad, somewhat pointed at the tip, which is cleft. The 3rd abdominal segment is scarcely produced at its apex above. In the ♀ the terminal

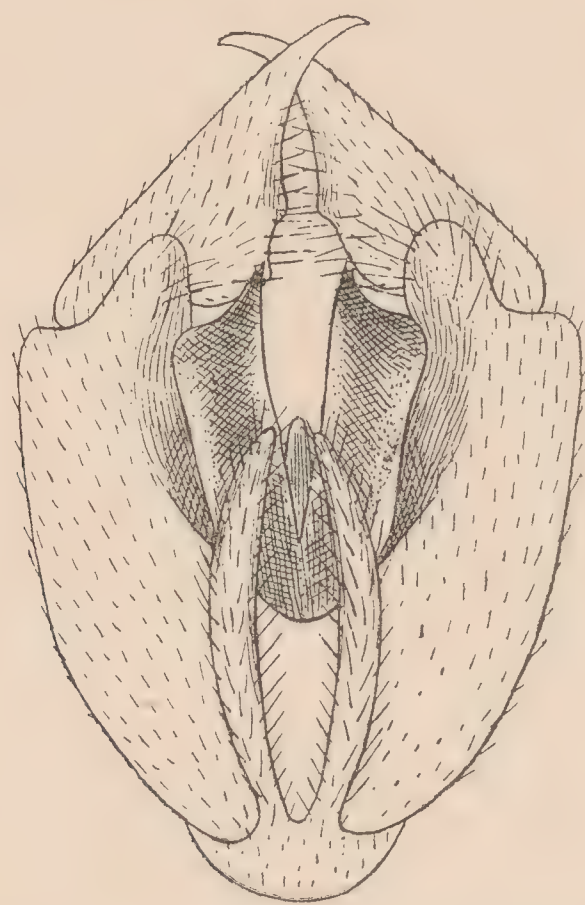


FIG. 2. — *Panorpa communis* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

segments are more or less brownish; the setae blackish. Legs testaceous; the tip of tibiae and of 1st, 2nd and 3rd tarsal joints brownish; 4th and 5th joints totally dark brown. Claws serrate. Wings hyaline with a faint yellowish tinge and sooty black bands and spots. The venation blackish brown.

This well-known and wide-spread species occurs in two forms, which can not be separated by any certain structural character, but they have a somewhat different appearance with regard to the markings of the wings.

FORMA I. — Slender. Wings obtuse at the apex. Bsp as a rule absent; if not, it is very small, never extending beyond the cubital branches. Smb present as two spots, never connected, often very small. Msp narrow and elongate. Ptb narrow in the middle, sometimes abrupt, forked posteriorly; Abr very narrow, often present as a small spot at the posterior margin of the wing. Ab with hyaline spots anteriorly and posteriorly.

Coll. SELYS (Belgian coll.) : 20 ♂, 51 ♀; (General coll.) : 10 ♂, 15 ♀.

This form has a wide range. It is known from most parts of Europe. By its less intensely marked wings it is separated from Forma II. In the Selysian collection are present a matured ♂ (Halloy) and a ♀ with quite hyaline wings with the exception of a yellowish brown spot, occupying the basal half of the pterostigma. From this form there is a number of transitional forms to the normally coloured specimens. Specimens with only the pterostigmatical and apical bands present are quite common.

FORMA II. — Stout. Wings proportionally short, broadly rounded at the tip. Bsp in forewing present and extends beyond Cu¹. Smb as a rule complete but narrow in the middle. Msp large. Ptb broad; Bbr broad; Abr often present as a spot at the hind margin of the wing. Ab broad and with a hyaline spot posteriorly. Sometimes Ab is occupied anteriorly and posteriorly by hyaline spots.

Coll. SELYS (Belgian coll.) : 35 ♂, 48 ♀; (General coll.) : 8 ♂, 19 ♀.

This form (described by IMHOFF and LABRAM as *P. vulgaris*) is not going so far northwards in Europe as the former, and it seems that the intensity of the colour of wings increases southwards. In the coll. SELYS are present specimens from Belgium, France, Germany, Switzerland and Siberia (Irkutsk, 1 ♂, 5 ♀). In the specimens from Irkutsk Abr is broader than in the European specimens.

P. nigrirostris Mac Lachlan (fig. 3, 4) (plate I, fig. 4).

Panorpa nigrirostris MAC LACHLAN, Ent. Monthl. Mag., XIX, p. 132 (1882).

Panorpa picta MAC LACHLAN, Trans. Ent. Soc. London, pp. 59-70, pl. IV, fig. 11 (1869) (nec HAGEN).

Head black; vertex somewhat blackish brown behind. Rostrum blackish brown, darker towards the apex, yellowish brown at the margins. Maxillary palpi blackish brown. Antennae black, 1st and 2nd basal joints narrowly yellowish brown at the tip. Thorax and abdomen black.



FIG. 3. — *Panorpa nigrirostris* ♂
Lateral view of abdominal segment
(Museum Tiflis).

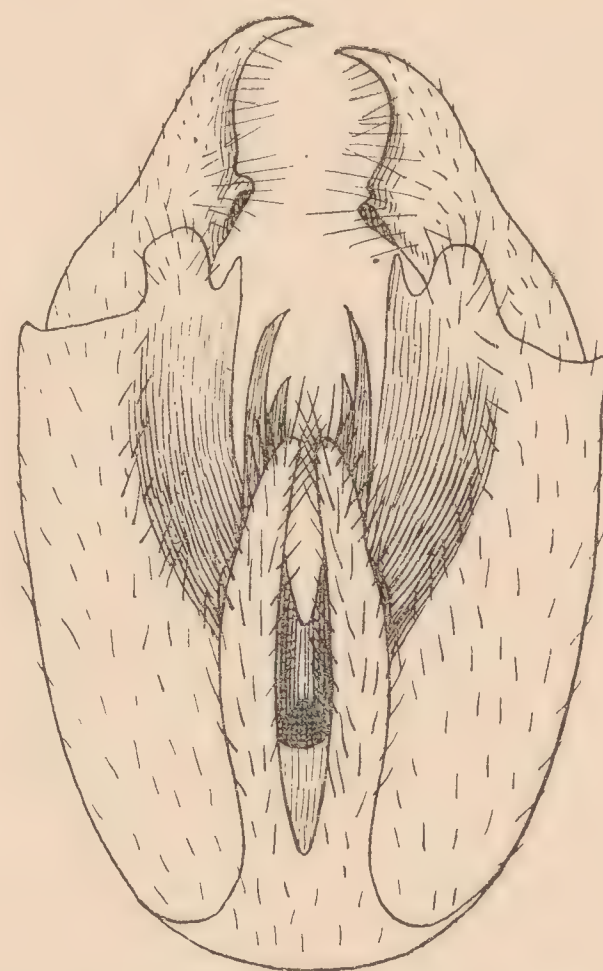


FIG. 4. — *Panorpa nigrirostris* ♂
Ventral view of terminal segment
(Museum Tiflis).

The sides of thorax and the coxae dark castaneous. In the male the 6th abdominal segment cylindrical, narrower at the apex, which is truncate. The 7th conical, nearly as long as the 6th and a little longer than the 8th, reddish brown at the base. The 8th conical, the apex somewhat obliquely truncated, reddish brown at base. The 9th reddish brown. The branches of lower appendage cylindrical, approximating at the base and apex. The upper appendage with deep rectangular incision. Setae long, slender and blackish. Forceps short, with a small, blunt dent at the base. In the female the terminal segments are dark brown, the cerci blackish. Legs testaceous. Apex of tibiae and of 1st, 2nd and 3rd tarsal joints brownish; 4th and 5th tarsal joints blackish brown. Claws serrate. Wings broad and obtuse, hyaline with a very slight

yellowish tinge, especially at base and apex. Venation blackish brown. Pterostigma yellowish. Bands and markings sooty black. Ab often enclosing a hyaline spot in its lower half; Ptb broad, forked in its lower half and much narrowed before the furcation. Msp large. Smb broad, irregular. Bsp half way between Smb and the base; sometimes a small spot on the costa not far from the base.

♂ forewing : 13-15^{mm}; hindwing : 12-14^{mm}; ♀ forewing : 14-16^{mm}; hindwing : 12-14^{mm}.

Coll. SELYS : 1 ♀ Persia. — Mus. Tiflis : ♂♀ Astrabad, Persia borealis; 2 ♂ Arus; 1 ♀ Esakei. — Deutsches Ent. Mus. : ♂ Astrabad (LEONHARD leg.). — Coll. MORTON : 1 ♂ Enzeli, Persia.

[*P. rufostigma* Westw.] (fig. 5, 6, 7).

Panorpa rufostigma WESTWOOD, Trans. Ent. Soc. London, IV, p. 186 (1846). — WALKER, Cat. Neur. Brit. Mus., p. 460 (1853). — MAC LACHLAN, Trans. Ent. Soc. London, pp. 59-70 (1869).



FIG. 5. — *Panorpa rufostigma* ♀
(Museum Berlin).

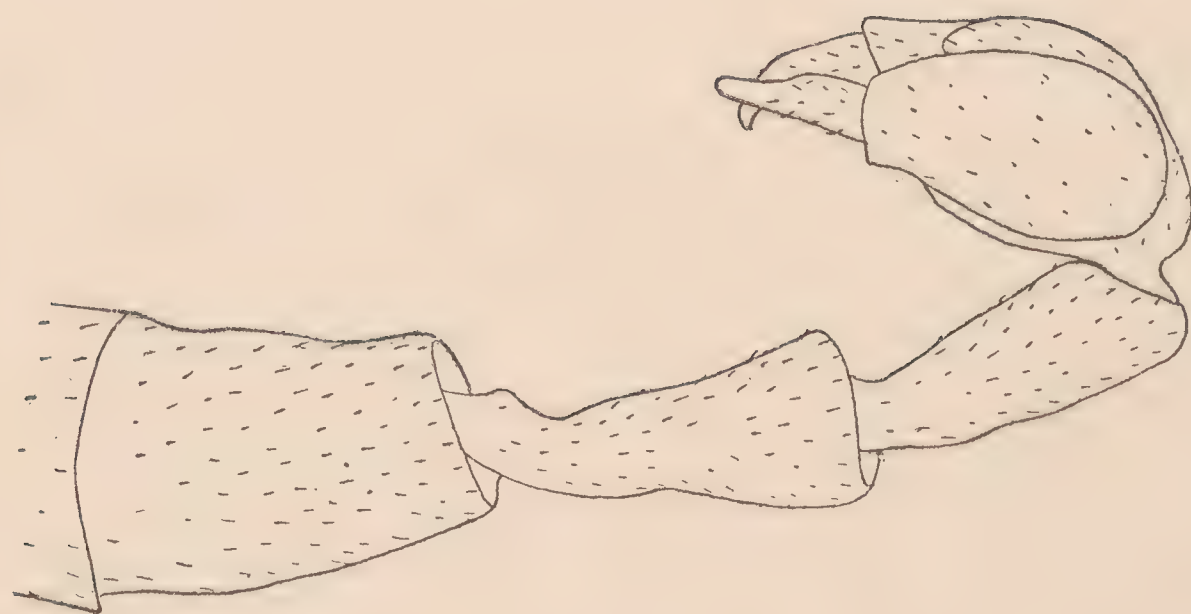


FIG. 6. — *Panorpa rufostigma* ♂
Lateral view of abdominal segment
(Museum Berlin).

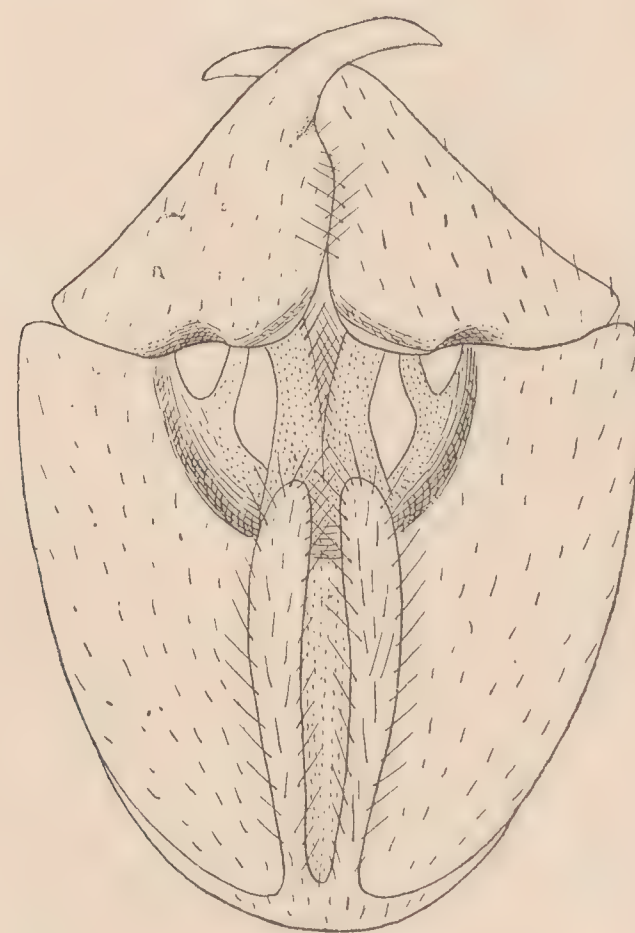


FIG. 7. — *Panorpa rufostigma* ♂
Ventral view of terminal segment
(Museum Berlin).

Head greyish brown; a black spot on the vertex enclosing the ocelli. Rostrum shining yellowish brown. Antennae blackish brown; the two basal joints yellowish brown. Thorax testaceous; two blackish

brown spots on the front-borders of meso- and metathorax. Abdomen reddish brown. Legs testaceous. Claws serrate. In the male the hind margin of third segment is scarcely produced in the middle above; 6th cylindrical, narrow towards the apex, which is somewhat obliquely truncate above; 7th and 8th segments much elongated, conical. Branches of lower appendage flattened, linear and with rounded apex; the tip of upper appendage with a very deep, nearly rectangular, incision. Titillators somewhat divergent at the base, a little broadened towards the apex, which is strongly curved inwards and sharply pointed; the inner margin with long hairs. Wings narrow with elliptical apices and a strong, yellowish brown tinge. Markings pale sooty brown. Pterostigma strongly red, conspicuous. Bsp present; Smb divided into two spots; Msp long; Ptb forked in its apical half; Ab broad, as a rule enclosing a hyaline spot in its apical half.

Forewing : 13-14^{mm}; hindwing : 12-13^{mm}.

Coll. SELYS : not present. — Mus. Berlin : 4 ♂, 2 ♀, Attica (ex coll. STEIN and TIEFFENBACH).

[**P. hybrida** Mac Lachlan] (fig. 8, 9).

Panorpa hybrida MAC LACHLAN, Ent. Month. Mag., XIX, p. 130 (1882) (Island of Ösel, Finland, Saxony). — ROSTOCK, Neuropt. Germ., p. 116 (1888). — KLAPÁLEK, Trans. Ent. Soc. London, p. 493, pl. X, fig. 5, 6 (1894) (Bulgaria, Roumelia). — ID., Rozp. Cesk. Akad. Cisare Frantis. Josefa, p. 15, pl. I, fig. 3, pl. II, fig. 3 (1896). — ID., Természetráji Füzetek, XXII, p. 438 (1899). — KEMPNY, Bull. Soc. Sc. de Bucarest, p. 673 (1906) (Roumania).

Head black above, yellowish posteriorly; rostrum yellowish with two longitudinal blackish streaks; maxillary palpi testaceous, terminal joint with blackish apex. Antennae blackish, basal joint brownish. Thorax black above; meso- and metathorax with a yellow central line and yellow scutellum. Sides testaceous.



FIG. 8. — *Panorpa hybrida* ♂
(Coll. Klapálek).

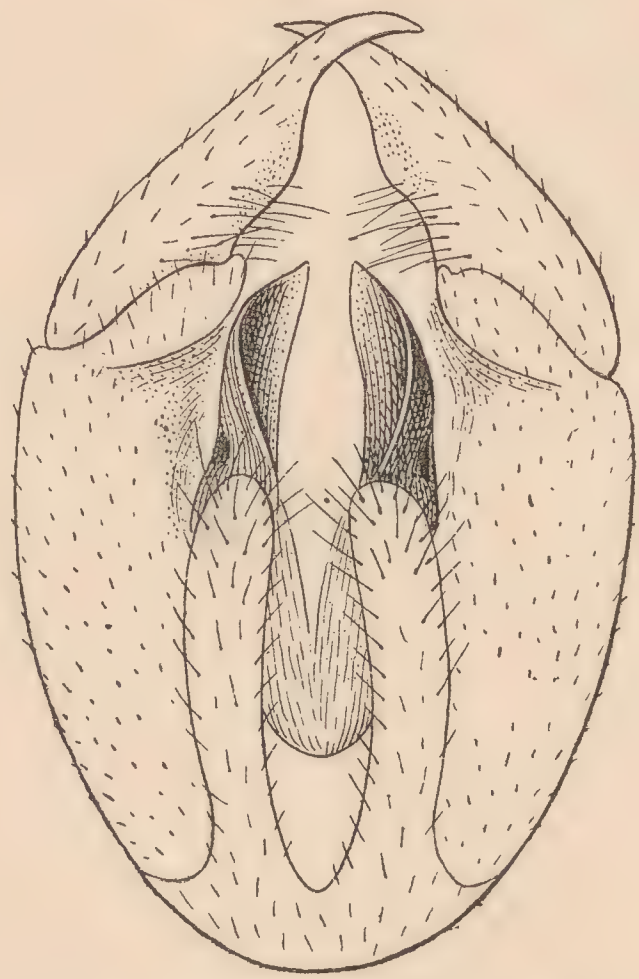


FIG. 9. — *Panorpa hybrida* ♂
Ventral view of terminal segment
(Coll. Klapálek).

Legs testaceous. Claws serrate. Abdomen blackish; the three terminal segments more or less brownish. In the male the third abdominal segment is produced above into a very large, rounded, testaceous hump, clothed with black hairs and extending to about the middle of the succeeding segment. 6th segment cylindrical, narrow towards the apex; 7th and 8th segments conical; the latter with obliquely truncate apex above. Branches of lower appendage flattened, short, with rounded tips, apical half blackish, with dark hairs. Upper appendage short, very broad, a little narrow towards the apex, which is truncate and scarcely incised. Titillators broad, somewhat pointed at their apices and with an obliquely running, much elevated keel on their upper side. Wings broad, broadly elliptical at the tip, hyaline with yellowish tinge, and dark brown venation; cross veins brownish shaded. Pterostigma pale yellowish or reddish yellowish. Bsp not present; Smb indicated by one or two spots (the anterior one large, the posterior one in the forewing as a rule wanting); Msp large; Ptb is some-

times only indicated by a large spot in front margin, a smaller one in the middle of the wing and two spots at the posterior margin: Ab distinct and with a hyaline spot posteriorly or more or less occupied by hyaline spots between the longitudinal veins.

Forewing : 14-16^{mm}; hindwing : 12-14^{mm}.

Coll. SELYS : not present. — Coll. KLAPÁLEK : 1 ♂, Neratovice. — Coll. ESBEN-PETERSEN : 1 ♂, Roumania (MONTANDON leg.).

This species seems to occur in a wide area, but it is never found in great numbers. It is known from Finland, Germany, Russia, Bulgaria and Roumania. It is closely related to *P. germanica* as to abdominal characters in the male and as to markings of the wings, but it is more stout.

[*P. clavigera* Klap.].

Panorpa clavigera KLAPÁLEK, Természetrázi Füzetek, XXV, p. 166, fig. (1902).

KLAPÁLEK, loc. cit. :

« Kopf oben schwarz, mit einem rothbraunen Punkt auf dem Hinterhaupt hinter jedem Auge, unten gelbbraun; die einfachen Augen auf glatten scharf umschriebenen Hügeln gestellt. Quer über die Stirn ist der Kopf dicht gekörnt und das rundlich gewölbte Hinterhaupt quer gerunzelt. Der Rüssel sehr lang (1.71), gelbbraun, mit zwei sehr scharfen schwarzbraunen Längsstreifen. Fühler schwarz, das Grundglied sowie die Einlenkungsstelle gelbbraun. Thorax oben schwarz; Pronotum am Hinterrand mit vier kleinen Flecken, zwei grösseren seitlichen und zwei kleineren zusammenfliessenden mittleren; Meso- und Metanotum mit den übrigen glockenförmigen Flecken, welche sehr verlängert sind und fast eine zusammenhängende Mittellinie bilden. Die Unterseite der Brust und die Beine schmutzig gelbbraun. Die Hinterleibsringe 1-6 schwarz mit rothbraunen Seitenrändern, die übrigen röthlich gelbbraun. Flügel glashell, aber alle Queradern braun angeraucht. Von den Querstreifen ist nur eine schmale subapicale Querbinde vorhanden, welche aber der äussere Ast fehlt; die Makeln sind klein, besonders die Apicale ist sehr reducirt. Pterostigma gelblich braun.

Beim ♂ unter dem stark erhobenen Hinterrand des Metanotum entsteht eine Querrinne von röthlich-brauner Färbung; sie ist vorne durch das in der Mitte gespaltene kurze erste Segment und durch die kantenartig erhobene Vorderpartie des zweiten Ringes begrenzt. Eine weit tiefere Querrinne ist zwischen dem Hinterrand des zweiten und dem Vorderrande des dritten Ringes, welche daselbst als scharfe Kanten erhoben sind. Der dritte Ring ist hinten in der Mitte in einen keulenartigen Fortsatz verlängert, welcher unten schwarz, in der Mitte röthlichbraun und an der verdickten Spitze wieder schwarz und mit kurzen schwarzen Spitzen dicht besetzt ist. Die Rückenfläche des vierten Ringes ist unter dem Fortsatz ausgehöhlt und erhebt sich kurz vor dem Hinterrande gerade gegenüber der Spitze desselben in eine starke und mit schwarzen Spitzen besetzte Querkante. Der sechste Ring ist fast walzenförmig, auf dem Rücken am Hinterrand sehr seicht und breit ausgeschnitten; der siebente und achte Ring schmal konisch. Forceps länglich eiförmig, ziemlich schmal. Die ventralen Aeste des neunten Ringes sind sehr lang und schmal, gleichmässig breit, an der Spitze abgerundet und vor derselben nach unten gebogen, so dass eine schiefe stumpfe Kante entsteht; sie sind so, wie der übrige Forceps gefärbt, nur vor der Spitze, etwa an der Kante verschwommen schwärzlich; nur ihre Innenkante ist mit nicht zu dichten schwarzen Borsten besetzt; sonst sind die Börstchen kurz. Der Mittellappen des neunten Dorsalbogens ist breit, stark verlängert und nur wenig ausgeschnitten. Die ventralen Spitzen des Penis sind mässig breit, schief zugeschnitten und abgestumpft; der dorsale Theil läuft in zwei lange parallele Spitzen aus. Flügelspannung : 36^{mm} ».

Coll. SELYS : not present.

I have not seen specimens of this species. The only known specimen is a ♂ from Hercegovina (coll. KLAPÁLEK). The species seems to be very closely allied to *P. hybrida*, what also KLAPÁLEK states.

P. germanica Linné (fig. 10).

Panorpa germanica LINNÉ, Syst. nat., X, p. 551 (1758). — GMELIN, Syst. nat., XIII, p. 2646 (1788). — CURTIS, Brit. Ent., pl. 696 (1834). — RAMBUR, Hist. Nat. Ins. Névr., p. 329 (1842). — MAC LACHLAN, Trans. Ent. Soc. London, p. 215, pl. XI, fig. 7a, 7b (1868). — Id., ibid., p. 59, pl. IV, fig. 4a, 4b (1869). — WALLENGREN, Svenska Vetensk. Akad. Handl., IX, p. 70 (1871). — MEYER-DÜR, Mittheil. Schweiz. entom. Ges., IV, p. 358 (1874). — MAC LACHLAN, Soc. Ent. Belg., p. 9 (sep.) (1881) (Belgium). — Id., Revue d'Entom., p. 8 (sep.) (1888) (Vosges). — SCHOCH, Neur. Helv. Planip., p. 11 (1885). —

- SCHOYEN, Christ. Vidensk. Forh., XIII, p. 12 (sep) (1887) (Norway). — ROSTOCK, Neur. Germ., p. 116 (1888). — ALBARDIA, Cat. rais. syn. Névr., p. 114 (1889). — DZIEDZIELEWICZ, Sprawozd. Kom. fizyogr., p. 26 (1894) (Galicia). — Id., ibid., p. 40 (1911). — KLAPÁLEK, Rozp. Cesk. Akad. Cisare Frantis. Josefa, p. 13, pl. I, fig. 2, pl. II, fig. 2 (1896). — HEYDEN, Ber. Senck. Nat. Ges. Frankf. a. M., p. 111 (1896). — MORTON, Ent. Month. Mag., XII, p. 30 (1901) (Norway). — STROBL, Mitt. nat. Ver. Steierm., p. 242 (1905) (Steiermark). — KEMPNY, Bull. Soc. Scienc. Bucarest, p. 673 (1906) (Roumania). — MONTANDON, ibid., p. 679 (1906). — ESBEN-PETERSEN, Ent. Medd. Köbenhavn, III, p. 48 (1906) (Denmark). — NAVAS, Neur. de España y Portugal, p. 150 (1906-1908). — MJÖBERG, Ent. Tidskr Stockholm, p. 161, fig. 43, 44, 49, 50 (1909). — LUCAS, The Entomologist, p. 187, pl. IV, fig. 3 (1910) (England). — Ibid., p. 307 (1913). — Ibid., p. 88 (1917). — Ibid., p. 57 (1919). — LACROIX, Insecta, pp. 99-103, fig. 10-14 (1913) (France). — Ibid., p. 361 et seq. (1913).
- Panorpa affinis* LEACH, Zool. Misc., II, p. 98, pl. 94, fig. 2 (1815). — CURTIS, Brit. Ent., pl. 696 (1834). — STEPHENS, Ill., VI, p. 52 (1836).
- Panorpa apicalis* STEPHENS, Ill., VI, p. 52 (1836). — KING, Ent. Month. Mag., XX, p. 141 (1883-1884) (Scotland).
- Panorpa borealis* STEPHENS, Ill., VI, p. 53 (1836).
- Panorpa montana* BRAUER, Neuropt. austr., p. 36 (1857).
- Panorpa gibberosa* MAC LACHLAN, Trans. Ent. Soc. London, pp. 59-70, pl. IV, fig. 5a, 5b (1869). — KLAPÁLEK, Trans. Ent. Soc. London p. 493 (1894).

Head brown with a blackish spot above, enclosing the ocelli. Rostrum brown. Maxillary palpi brown, the apical joint blackish. Antennae blackish, basal joint pale brown, 2nd joint

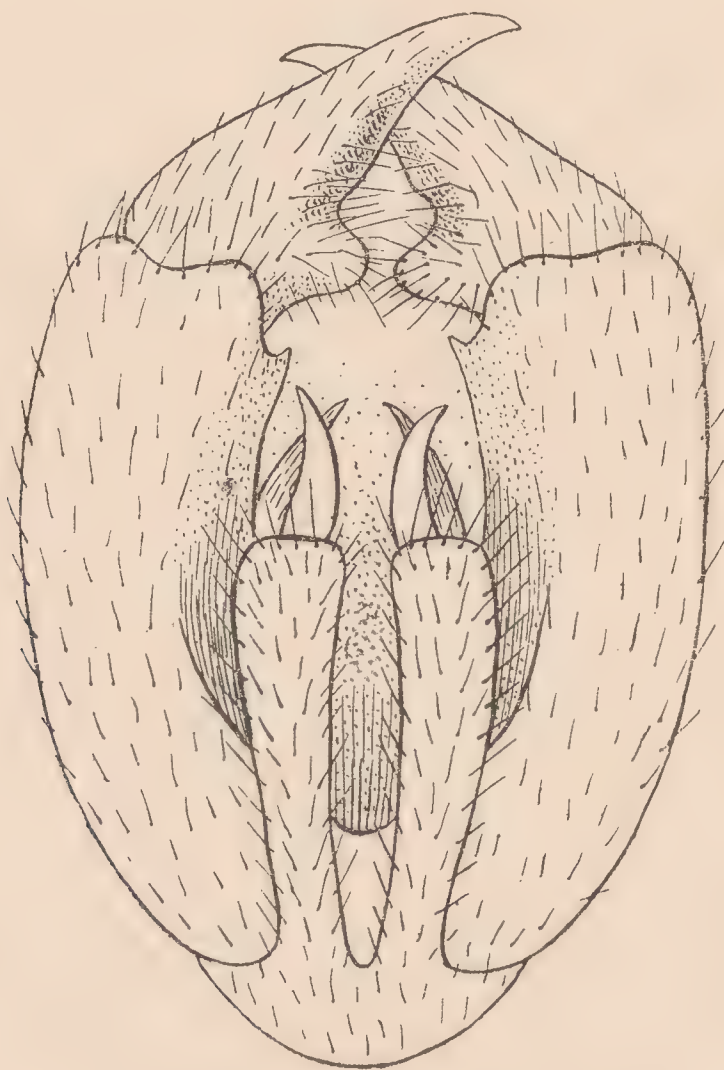


FIG. 10. — *Panorpa germanica* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

brown. Thorax dorsally blackish. Meso- and metathorax dorsally with a pale longitudinal median line. Abdomen blackish brown. In the male the three terminal segments are pale brown; the posterior margin of third segment is strongly produced in the middle above. The 6th segment scarcely longer than the 7th, narrow towards the apex, which is truncate. 7th and 8th segments

of the same length, cone-shaped; the apex of 8th segment obliquely truncate above. Upper appendage narrower towards the apex, which is truncate,

Branches of lower appendage short, with truncate apices. Titillators deeply cleft; the exterior branch very long, narrow and often bent downwards. Forceps short, with a large blunt dent at the base. In the female the apical segments are brownish. Legs pale brown; the apex of tibiae and of tarsal joints a little darker. Wings hyaline with a slight yellowish tinge. Pterostigma yellowish. Markings small. Bsp very small, not present in the hindwing. Smb indicated by two small spots; the posterior one is very often absent in the hindwing. Msp small, absent in the hindwing. Ptb indicated by four spots, one in the basal part of pterostigma, one in the middle of the wing and two at the hind margin. Ab narrow, divided into a larger one at the extreme apex and a smaller one nearer to the hind margin.

Forewing : 12-15^{mm}; hindwing : 11-14^{mm}.

Coll. SELYS (Belgian coll.) : 16 ♂, 13 ♀; (General coll.) : 6 ♂, 4 ♀.

This species is common in Northern and Central Europe, and it also occurs in Greece. Without hesitation I regard *P. gibberosa* MAC LACHLAN as synonymous with *P. germanica*. I have examined the type-specimens of MAC LACHLAN (in the Selysian collection, ♂ from Montenegro, ♀ from Tinos, ERBER leg.), and I am not able to find any structural difference. The wings have a little more intense yellowish tinge, and in the male they are less spotted than usually in the species. In my own collection I have a ♂ from Greece with the strong yellowish tinge and with the same divergence in the wing markings. The form *borealis* STEPH. without any wing markings is found in Scotland (coll. ESBEN-PETERSEN, MORTON leg.) and Norway (Mus. London, KIRBY leg.). Many transitional forms between specimens with quite unmarked wings and specimens with normally coloured wings are found.

[*P. deceptor* Esben-Peters.] (fig. 11).

Panorpa deceptor ESBEN-PETERSEN, Ent. Mitt., II, p. 263, fig. 13, 14 and 15 (1913). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ., p. 390 (1913).

Head, rostrum and maxillary palpy yellowish brown, tip of apical joint darker; on the vertex a brownish black spot, enclosing the ocelli. Antennae blackish; the two basal joints yellowish brown. The

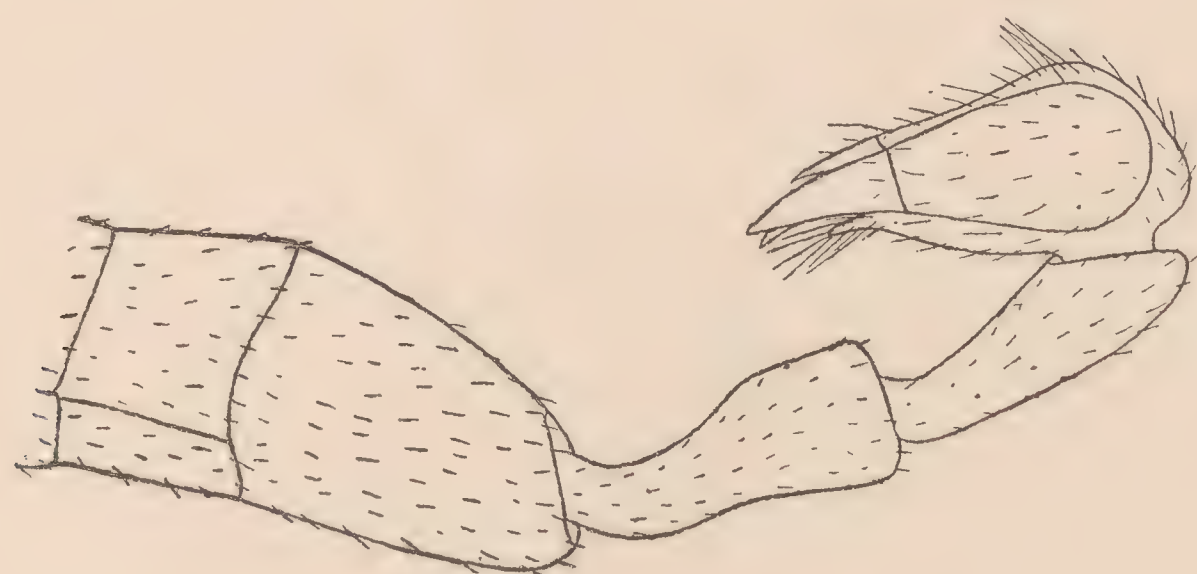


FIG. 11. — *Panorpa deceptor* ♂
Lateral view of abdominal segments
(Coll. Esben-Petersen).

dorsum of prothorax black with some small pale spots. Meso- and metathorax yellowish brown with a broad blackish streak along the side margins. The 1st to 5th abdominal segments in the greater part of specimens mostly blackish brown; the rest of abdominal segments and the venter of thorax pale brown. Legs yellowish brown; the tip of tarsal joints darker. In the male the hind border of third abdominal segment produced into a broad semicircular lobe; 6th segment almost conical with obliquely truncate apex; 7th segment as long as

the 6th, much thinner, the apical part much thicker than the basal part; 8th segment a little longer than 7th, gradually incrassate towards the apex, which is obliquely truncate above. Branches of lower appendage short, flattened; upper appendage somewhat pointed; near the tip the side margins are produced into two prolongations, which are parallel with the tip and as long as tip. Titillators threadlike and almost reaching the tip of the forceps. Wings hyaline with a very faint yellowish tinge and with sooty brown markings. Ab is rather broad, sometimes enclosing hyaline spots; Ptb furcates in its posterior half; Bbr the broadest of the branches; Msp long and narrow; Smb indicated by two spots; Bsp present in the forewing.

Forewing : 14-15^{mm}; hindwing : 13-14^{mm}.

Coll. SELYS : not present. — Mus. Leyden : 1 ♀, Formosa 1909 (SAUTER leg.). — Deutsches Ent. Mus. : 14 ♂, 29 ♀, Formosa (SAUTER leg.). — Mus. Berlin : 7 ♂, 7 ♀ Taihorin, Formosa (SAUTER leg.). — Coll. ESBEN-PETERSEN : 4 ♂, 4 ♀, Formosa (SAUTER leg.).

P. cognata Ramb. (fig. 12).

Panorpa cognata RAMBUR, Hist. Nat. Ins. Névr., p. 330 (1842). — MAC LACHLAN, Trans. Ent. Soc. London, p. 216, pl. XI, fig. 8, 8a (1868). — Trans. Ent. Soc. London, pp. 59-70, pl. IV, fig. 10a, 10b (1869). — MEYER-DÜR, Mitth. Schweiz. Ent. Ges., IV, p. 358 (1874). — SCHOCH, Neur. Helv. Planip., p. 11 (1885). — ROSTOCK, Neur. Germ., p. 115 (1888). — WALLENGREN, Svenska Vetensk. Akad. Handl., IX, p. 71 (1871). — MAC LACHLAN, Soc. Ent. Belg., p. 9 (sep.) (1881) (Belgium). — ALBARDA, Cat. rais. syn. Névropt., p. 114 (1889). — Klapálek, Rozp. Cesk. Akad. Cisare Frantis. Josefa, p. 16, pl. I, fig. 4; pl. II, fig. 4 (1896). — HEYDEN, Ber. Senck. Nat. Ges. Frankf. a. M., p. 111 (1896). — STROBL, Mitt. nat. Ver. Steierm., p. 241 (1905) (Steiermark). — ESBEN-PETERSEN, Ent. Medd. Köbenhavn, III, p. 47 (1906) (Denmark). — WEELE, Tijdschr. v. Ent., p. 127 (1907). — MJÖBERG, Ent. Tidskr. Stockholm, p. 161, fig. 45, 47 (1909). — DZIEDZIELEWICZ, Sprawozd. Kom. fizyogr., p. 40 (1911) (Galizia). — LUCAS, The Entomologist, p. 187, pl. IV, fig. 2 (1910) (England). — Ibid., p. 59 (1919). — LACROIX, La Feuille des Jeunes Naturalistes, p. 45 (1914).

Panorpa germanica STEPHENS, Ill., VI, p. 53 (1836) (nec LINNÉ). — BRAUER, Neur. austr., p. 36, lig. 18 (1857).

Panorpa alpina HAGEN, Ent. Ann., p. 32 (1858) (nec RAMBUR).

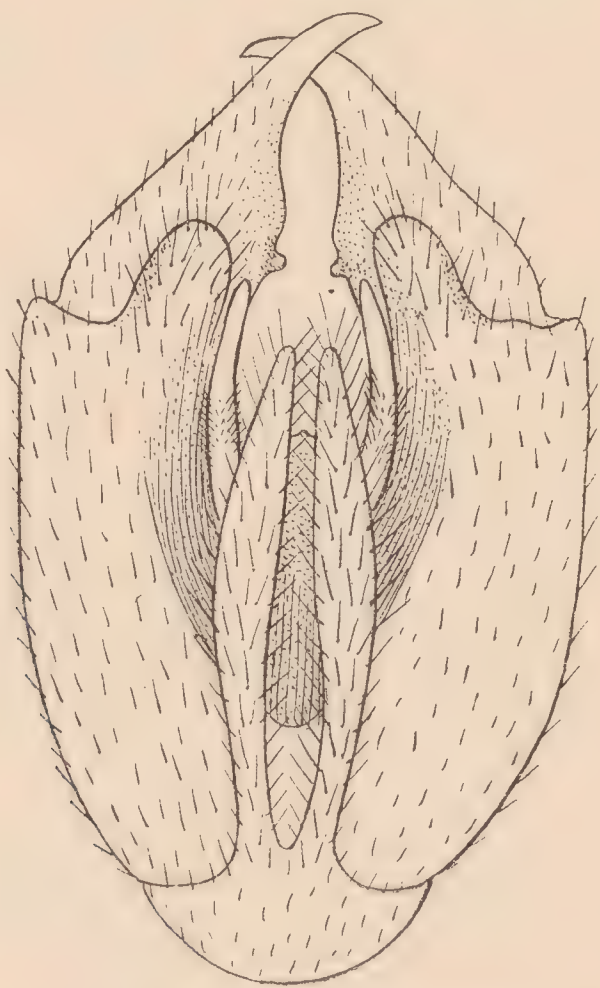


FIG. 12. — *Panorpa cognata* ♂
Ventral view of terminal segment
(Coll. Selys).

Head and rostrum brown; a black band across the head, enclosing the ocelli and projecting

downwards between the insertions of the antennae; the tip of the projection V-shaped. Antennae pitchy brown, the two basal joints brownish. Thorax dorsally blackish with a median, longitudinal streak on the meso- and metathorax. Abdomen dorsally blackish, ventrally pitchy brown; the terminal segments brownish. Legs brown; tip of tibiae and tarsal joints darker. Claws serrate. In the male the third abdominal segment considerably produced in the middle of its apical margin above; 6th segment oblong, longer than broad, somewhat produced at its apex above; the sides excised; 7th segment subcylindrical, its upper edge scarcely swollen near the base, concave towards the apex and with the tip slightly elevated; rather shorter than 6th; 8th cylindrical, cone-shaped, obscure. Branches of lower appendage long, cylindrical, straight, slightly divergent. Upper appendage short, with nearly parallel sides and truncate apex, which is broadly incised. Wings hyaline with a slight yellowish tinge and with brownish markings. In the forewings Smb is indicated by two small dots; Msp is present but small; in both wings Ptb broad in the anterior part; the branches of the fork very narrow and sometimes obscure in the hindwing, Ab broad, with a large hyaline spot posteriorly and a smaller one anteriorly. Sometimes only Ptb and Ab present.

Forewing : 12-14^{mm}; hindwing : 11-13^{mm}.

Coll. SELYS (Belgian coll.) 6 ♂, 6 ♀; (General coll.) 4 ♂, 4 ♀ (RAMBUR's type present).

The species is known from Central Europe, England, Belgium, Holland, Denmark and Sweden.

P. meridionalis Ramb. (fig. 13) (plate I, fig. 2).

Panorpa meridionalis RAMBUR, Hist. Nat. Ins. Névr., p. 329 (1842). — ED. PICTET, Syn. Névr. d'Espagne, pl. VIII, fig. 9, 10, 11, 12, p. 83 (1865). — MAC LACHLAN, Trans. Ent. Soc. London, pp. 59-70, pl. IV, fig. 7a, 7b (1869). — ID., Ent. Monthl. Mag., XVII, p. 108 (1880) (Portugal). — Ibid., XXV, p. 344 (1889) (Spain). — Ibid., XXXVIII, p. 129 (1902). — MONTANDON, Bull. Soc. Scienc. Bucarest, p. 679 (1906) (Roumania). — NAVÁS, Neur. de España y Portugal, p. 149 (1906-1908). — LACROIX, Insecta, p. 371 (1913) (France).

Panorpa meridionalis var. *fenestrata* NAVÁS, ibid., p. 150, pl. V, fig. 8, 9, 10.

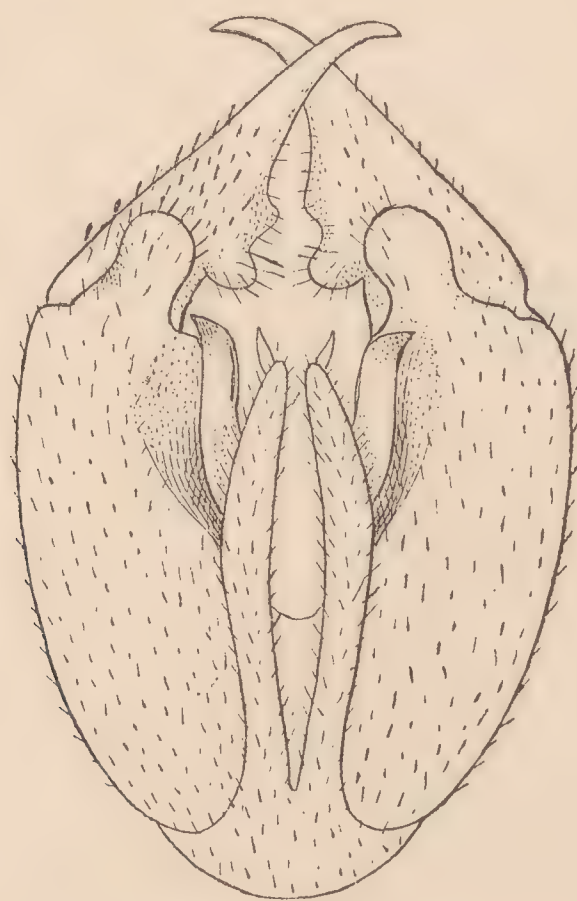


FIG. 13. — *Panorpa meridionalis* ♂
Ventral view of terminal segment
(Coll. Selys).

Head and rostrum reddish brown, a black cross band on the vertex between the eyes, extending below the insertion of the antennae and often projecting downwards along the rostrum as two streaks; the apex of rostrum black; maxillary palpi blackish; antennae blackish.

Thorax dorsally blackish; meso- and metathorax with a pale, sometimes abrupt, median streak. Abdomen blackish, the three terminal segments reddish brown. In the male the third abdominal segment is scarcely produced in the middle of hind border above; 6th segment oblong; the upper surface concave and produced at the apex in a triangular prolongation, the sides incised; 7th and 8th cone-shaped, short, narrow at the base and very much dilated at the tip. Branches of lower appendage linear, flattened, approximated at the base and apex. Upper appendage broad, narrow towards the apex, which is deeply and broadly incised. Titillators cleft, the exterior branch broadest. Legs brown, the tibiae and tarsal joints narrowly blackish banded at the apex. Claws serrate. Wings broad, obtuse at the apex, strongly marked with deep black; the longitudinal veins blackish, cross veins paler. The markings generally on the same plan as in *P. communis* forma II, except that the bands and spots ordinarily are broader and the hyaline anterior spot in Ab as a rule is absent.

Forewing : 13-15^{mm}; hindwing : 12-14^{mm}.

Coll. SELYS : 5 ♂, 13 ♀ (RAMBUR's type (♂) is present). — Mus. London, 2 ♂, 1 ♀ (Escorial). — Coll. ESBEN-PETERSEN : 2 ♂, 5 ♀ (Spain) (NAVÁS leg.).

The species sometimes varies as to the markings of the wings. In the Selysian collection are 4 ♀, in which the bands are narrow and abrupt. In the examples in the British Museum the apical band is occupied by hyaline spots, placed between the veins, and Bbr is absent (forma *fenestrata* NAV.). It occurs in Central and South France, Pyrenees, Spain, Portugal and Roumania.

P. annexa Mac Lachl. (fig. 1, 14).

Panorpa annexa MAC LACHLAN, Trans. Ent. Soc. London, pp. 59-70, pl. IV, fig. 8a, 8b (1869) (Monte Viso, Sicily). — LACROIX, Feuille Jeun. Nat., Rennes-Paris, p. 8 (sep.) (1913) (France).

Panorpa meridionalis SCHNEIDER, Stett. Ent. Zeit., p. 340 (1845) (nec RAMBUR).

Panorpa cognata var. HAGEN, Ann. Soc. Ent. France, p. 747 (1860) (nec RAMBUR).

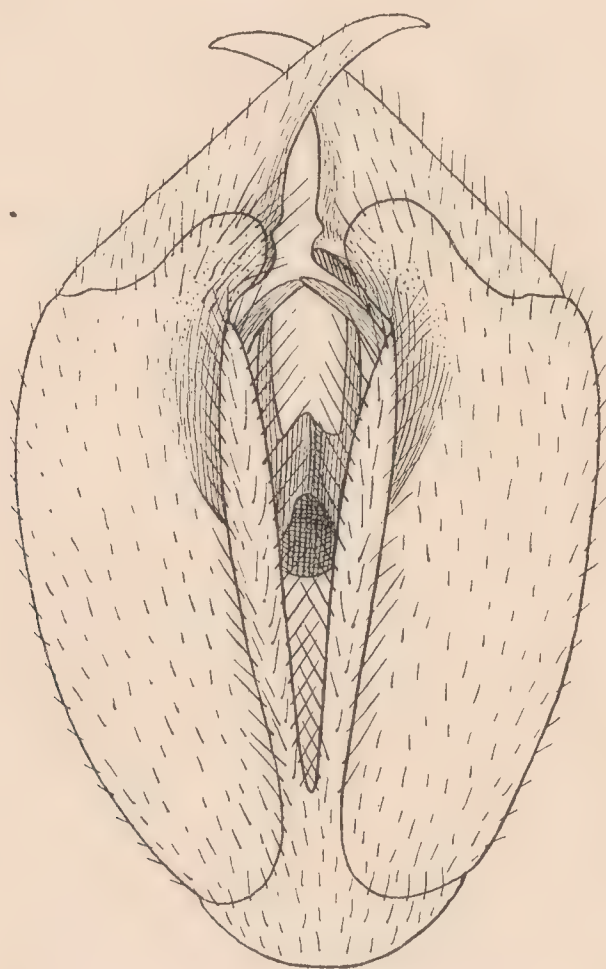


FIG. 14. — *Panorpa annexa* ♂
Ventral view of terminal segment
(Coll. Selys).

Head and rostrum brown; a blackish spot above the antennae enclosing the ocelli and produced downwards between the insertion of the antennae as a small streak. Antennae brownish black, basal joint brown. Thorax blackish above, the sides testaceous. A longitudinal

testaceous band of unequal breadth along the middle of meso- and metathorax. Abdomen blackish; the three terminal segments brownish. Legs testaceous; the apical joints with a narrow dark brown band at the tip. Claws serrate. In the male the third abdominal segment is slightly produced in the middle of its apical margin above; 6th segment short, nearly as broad as long, the lateral margins deeply incised, the apex above scarcely produced; 7th nearly as long as the 6th, inserted below the incision; viewed from the side its lower edge is straight, its upper edge greatly swollen near the base, then deeply concave and finally raised at the apex; 8th segment subcylindrical, scarcely cone-shaped, slightly swollen above towards the base. Branches of lower appendage straight, linear, flattened, divergent from base to apex. The apex of upper appendage deeply and broadly incised. Titillators curved, broad and flattened at base, narrow and subcylindrical towards the apex, which reaches the base of the chelae. The inferior titillators smaller and pointed. Wings hyaline with a faint, yellowish tinge; markings sooty brown; venation blackish brown; cross veins, especially in the apical part, paler. Bsp present in the forewing, minute; Smb indicated by two longitudinal streaks, which are sometimes connected in the forewing; Msp elongate; Ptb broad in its anterior part, forked in the posterior; Bbr broad; Abr narrow, sometimes more or less obscure; Ab broad with a large hyaline spot posteriorly, sometimes the apical part occupied by one or two spots.

Forewing : 14-16^{mm}; hindwing : 12-14^{mm}.

Coll. SELYS : 1 ♂ Sicily (CHAVIGNY leg.), 1 ♀ Sicily (both of them are from coll. LATREILLE and MAC LACHLAN's types). — Mus. Copenhagen : 1 ♂, 2 ♀ Sicily. — Coll. ESBEN-PETERSEN : 2 ♂, 1 ♀ Deux-Sèvres (ex. coll. LACROIX). — Coll. O. LE ROI : 1 ♂ Gardane, Italy.

The species has great likeness to *P. meridionalis*, but all the markings of wings are smaller and less intense. In the two males from Deux-Sèvres the apical part of exterior titillators are less curved, nearly straight.

[*P. Ghilianii* Mac Lachl.].

Panorpa Ghilianii MAC LACHLAN, Trans. Ent. Soc. London, pp. 59-70, pl. IV, fig. 9a, 9b (1869) (Turin).

MAC LACHLAN, *loc. cit.* :

« A small species, and strongly marked with black. In the anterior wings there is a small spot in the disc near the base; three spots before the middle, a small costal spot in the middle, a sub-apical fascia formed by a large costal spot emitting two narrow branches to the inner margin, and a very broad black apex, which encloses one or two pale dots at its upper and lower edges. Third abdominal segment (♂) not produced above; 6th formed as in *P. annexa*, but longer, and with the apex more produced above, as in *P. meridionalis*; seventh inserted below the excision, slightly shorter than the sixth, formed much like that in *P. annexa*, but shorter, thinner at the base, the upper edge less swollen, and the swelling further from the base, afterwards less concave and less elevated at the apical margin; eighth shorter than the seventh, sub-cylindrical, scarcely cone-shaped; appendices of the last segment short, flattened, rather broad, obtusely rounded at the apex, nearly parallel (a larger lobe at the base of the claws of this segment). »

Coll. SELYS : not present.

I have not seen specimens of this species and the description given above is a copy of that of MAC LACHLAN. The species seems to be closely allied to and probably the same as *P. annexa*.

P. picta Hagen (Plate I, fig. 3).

Panorpa picta HAGEN, Wien. Ent. Monatschr., VII, p. 199 (1863). — MAC LACHLAN, Ent. Monthl. Mag., XIX, p. 132 (1882). — KLAPÁLEK, Bull. intern. Akad. Scienc. Bohême, p. 5, fig. 6 (1901).

Head, rostrum, maxillary palpi, antennae, thorax and abdomen jet black; the base of rostrum sometimes dark brownish. Legs pitchy brown; femorae darker. Claws serrate. In the male the 6th abdominal segment is cylindrical, narrow towards the apex, the upper edge

somewhat incurved just before the tip; 7th nearly as long as 6th, conical; 8th shorter than 7th, conical, obliquely truncate at the apex above. Branches of lower appendage short, flattened, approximating at the tips; apices rounded. The apex of upper appendage deeply, incised. Titillators geniculated at the base, deeply cleft; the branches slender, the exterior pair the longest, crossing each other at their tips. The basal joint of forceps stout, suddenly narrowed at the apex; the apical joint relatively small. Wings hyaline with a faint yellowish tinge. Venation pitchy black. Markings exceedingly broad, distinct, sooty brown. Bsp (absent in hindwing) extending obliquely upwards to the front margin and sometimes also to the hind margin. Smb complete, very broad, broadest in the middle; Msp broad; Ptb very broad, forked in its lower half; the branches very broad and sometimes connected along the hind border of the wing (the space between the branches in that case formed as a round, hyaline spot); in its lower half Ab, which is rather broad, encloses a small, round, hyaline spot.

Forewing : 16-19^{mm}; hindwing : 15-18^{mm}.

Coll. SELYS : 2 ♂, 5 ♀ Anatolia. — Coll. KLAPÁLEK : 1 ♀ Taurus. — Mus. Tiflis : 4 ♀ Caucasus (VORONOW leg.). — Mus. Copenhagen : 1 ♂ Smyrna (the terminal segments wanting). — Coll. ESBEN-PETERSEN : 1 ♀ Amasia (ex coll. MORTON).

This species is the most strongly marked in the genus *Panorpa*. In the ♂ from Museum Copenhagen Smb, Msp, Ptb and Ab connected along the middle of the wing.

P. Selysi Esben-Petersen (fig. 15, 16) (plate I, fig. 5).

Panorpa Selysi ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 217 (1915).

Head and rostrum shining black. Maxillary palpi pitchy brown, the apical joint black. Antennae black; the apex of 1st and 2nd basal joints narrowly brownish. Thorax dorsally and

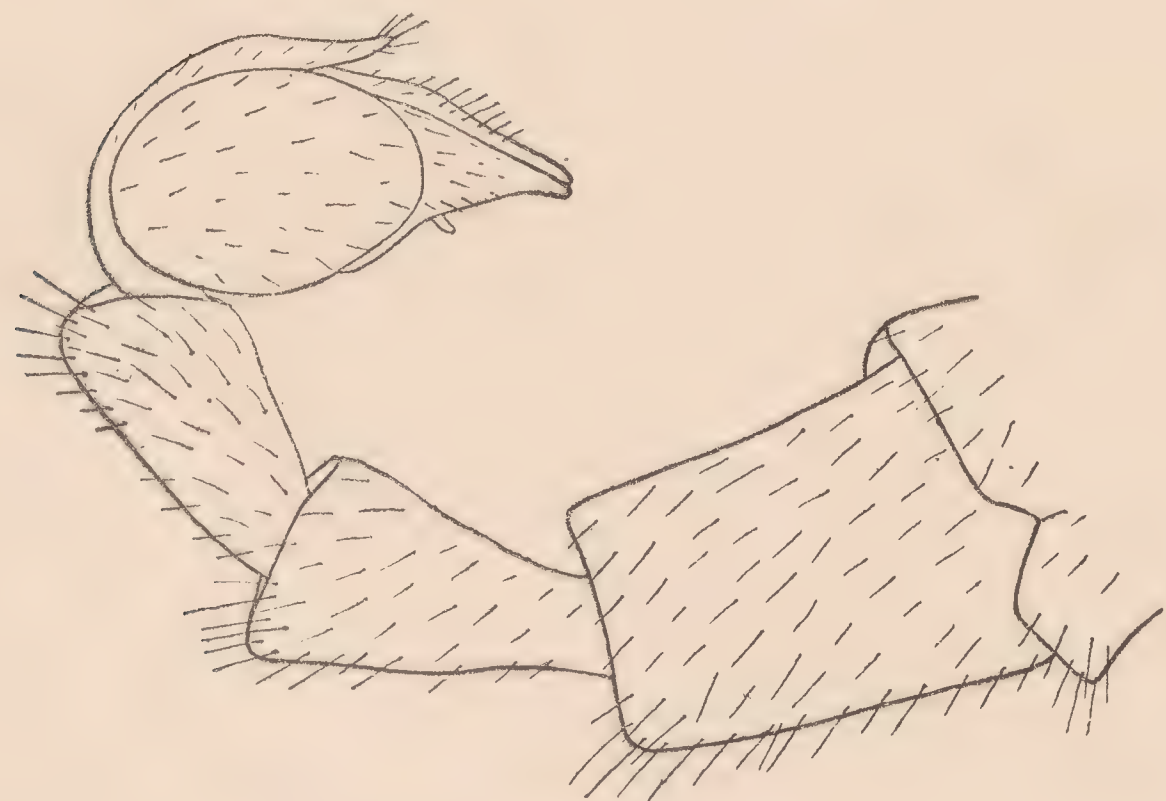


FIG. 15. — *Panorpa Selysi* ♂
Lateral view of abdominal segment
(Museum Vienna).

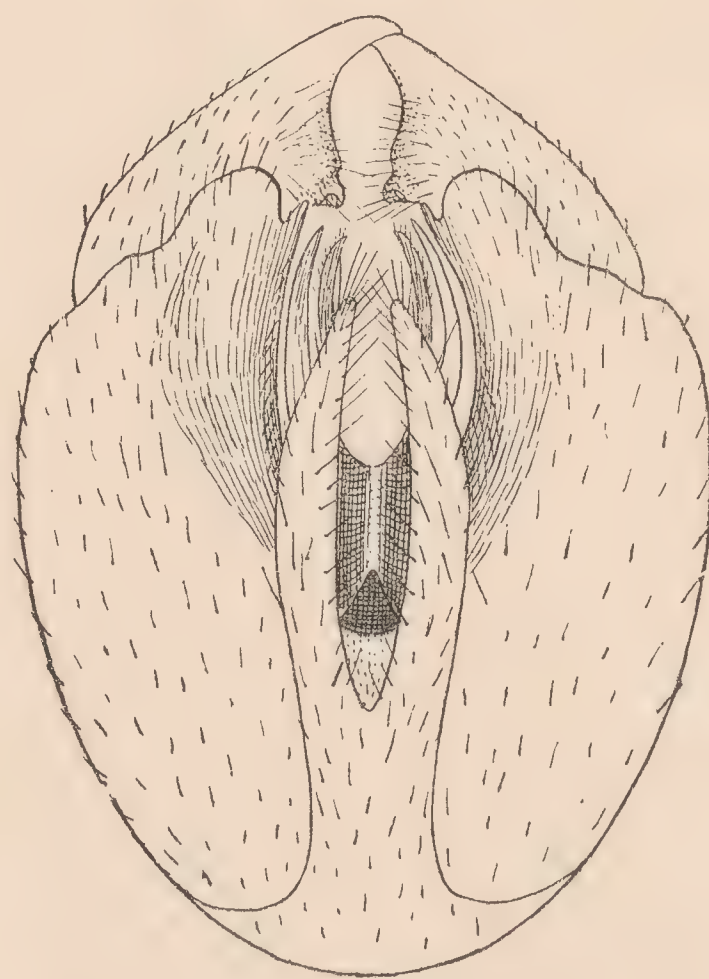


FIG. 16. — *Panorpa Selysi* ♂
Ventral view of terminal segment
(Museum Vienna).

ventrally pitchy black, paler in the female. Anterior margin of prothorax brownish. Abdomen pitchy black. 6th segment in the ♂ cylindrical, somewhat narrow at the apex, truncate, about 1 1/2 times longer than 7th, which is conical, reddish brown basally; 8th segment conical, the apex above somewhat obliquely truncate, basally reddish brown, nearly as long as 7th; 9th segment reddish brown. Branches of lower appendage cylindrical, approximating at the base and apex. Upper appendage broad, the apex with deeply rectangular incision. In the ♀ the

abdomen is pale; the hind margins of the segments narrowly bordered with brown; the terminal segments dark brown; setae black. Legs brownish yellow. The tip of tibiae and of the three basal joints of the tarsi brown; the 4th and 5th tarsal joints blackish brown. Claws serrate. Wings broad, obtuse at the tip, hyaline, with strongly yellowish tinge, especially at the base. All the veins strongly yellowish except in the markings, where the longitudinal ones are black. All the bands and spots distinct, broad and sooty black.

Forewing : 13-16^{mm}; hindwing : 12-14,5^{mm}.

Coll. SELYS : 2 ♀ Kaketie (type). — Mus. Vienna : 1 ♂ Elisabethopol (KINDERMANN leg.) (type); 1 ♀ Brussa, 1863 (LEDERER leg.). — Mus. Tiflis : 9 ♀ Caucasus.

This species is easily recognized by its strong yellowish tinge on the wings, by the yellow veins and by the blackish colour of the body. In one of the specimens in the Selysian collection the posterior part of all the black bands on the wings is traversed longitudinally by a pale line between each of the veins.

P. connexa Mac Lachlan (fig. 17) (plate I, fig. 1).

Panorpa connexa MAC LACHLAN, Trans. Ent. Soc. London, pp. 59-70, pl. IV, fig. 6a, 6b (1869) (Mingrelia). — ID., Ann. Soc. Ent. Belg., XII, p. 103 (1869).

Vertex black; front brownish yellow; rostrum brownish yellow with blackish tip; maxillary palpi yellowish with apical joint dark. Antennae brownish black; the basal joint and

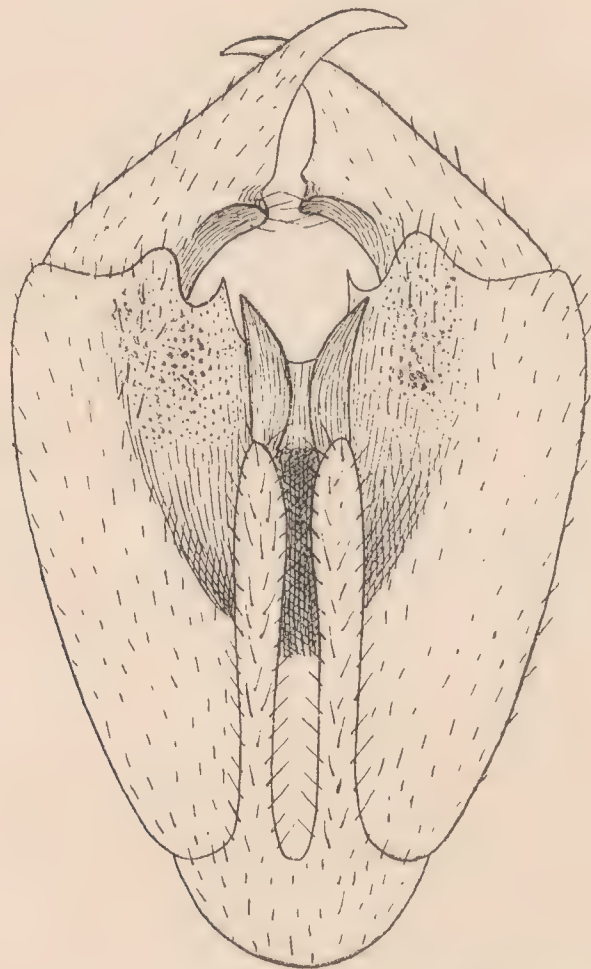


FIG. 17. — *Panorpa connexa* ♂
Ventral view of terminal segment
(Coll. Selys).

the antennal insertion brownish yellow. Thorax dorsally black, with a brownish yellow cross-streak between each of the thoracical segments; sides of thorax yellowish with a few minute black dots. In the male the first six abdominal segments are blackish above, testaceous below; 4th to 6th with brownish hind margin above; 7th to 9th brownish. Hind margin of third abdominal segment scarcely produced above; 6th cylindrical, narrow towards the apex; 7th and 8th cone-shaped, elongate; 7th a little shorter than 6th, but a little longer than 8th. Branches of lower appendage long, linear, slightly dilated towards the apex, but not truncate. Upper appendage long, somewhat narrow towards the apex, which is broadly and deeply incised. Titillators divergent, broad at the base, narrow towards the apex, which is pointed. Inferior margin yellowish haired. In the female the abdominal segments are blackish above, a little paler

below, with yellowish brown streak along the side-margins. The terminal segments a little paler. Legs brownish yellow; the tip of tarsal joints darker. Claws serrate. Wings hyaline with a faint yellowish tinge. Longitudinal veins brownish black; cross veins, especially in the apical part, paler. Markings sooty brown. Bsp not present; Smb indicated by two spots (absent in the hindwing and sometimes also in the forewing); Msp elongate, sometimes absent, Ptb indicated by a large wedge-shaped spot at the anterior margin and two small ones at the posterior margin (the apical one often wanting); Ab with a hyaline spot in its lower half; sometimes the band is divided into a large, apical one and a small one placed on the hind margin.

Forewing : 12-15^{mm}; hindwing : 11-14^{mm}.

Coll. SELYS : 4 ♂, 2 ♀ Mingrelia (DEYROLLE leg.) (MAC LACHLAN's types present). — Mus. Tiflis : 4 ♂, 11 ♀ (Caucasus).

[*P. similis* Esb.-Peters.] (fig. 18, 19, 20).

Panorpa similis ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 218 (1915).



Fig. 18. — *Panorpa similis* ♂
(Museum Tiflis).

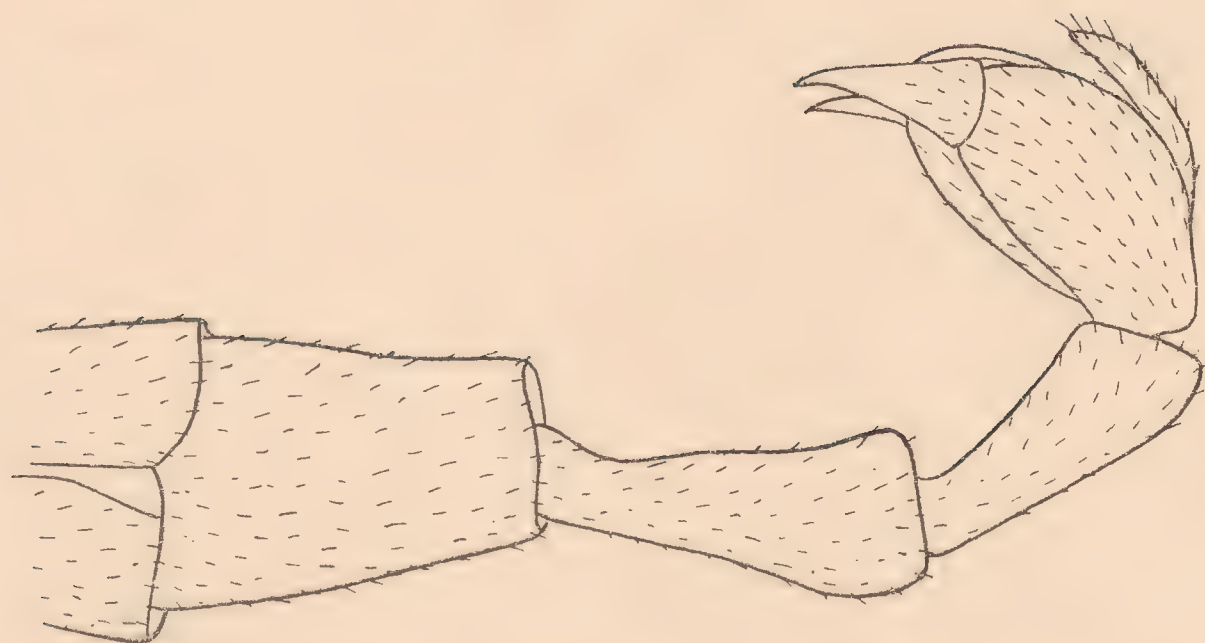


FIG. 19. — *Panorpa similis* ♂
Lateral view of abdominal segment
(Museum Tiflis).

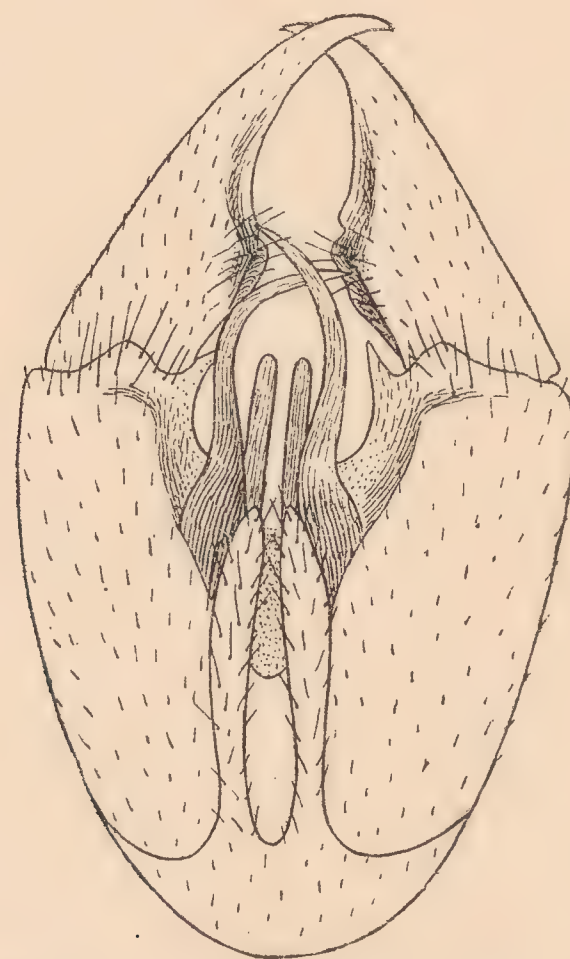


FIG. 20. — *Panorpa similis* ♂
Ventral view of terminal segment
(Museum Tiflis).

Head and rostrum shining black. Maxillary palpi reddish brown, apical joint black. Antennae black,

basal joint somewhat brownish. Thorax black above, the sides yellowish grey. Abdomen blackish with a brownish side streak; the three last segments more or less reddish brown. In the male the posterior margin of third segment above somewhat broadly produced. Sixth segment cylindrical, narrow towards the apex; 7th and 8th elongate, conical. The apical half of 7th and 8th segments and a broad band at the middle of the forceps blackish. Branches of lower appendage short, somewhat pointed; the apex of upper appendage broadly, but not deeply incised. Titillators long, curved, pointed towards the apex. Legs brownish yellow; the tip of tarsal joint darker; the fourth and fifth almost blackish. Claws serrate. Wings coloured and marked as in *P. connexa* with exception of the fact that the two spots, that indicate Smb, sometimes are present also in the hindwing.

Forewing : 12-15^{mm}; hindwing : 11-14^{mm}.

Coll. SELYS : not present. — Mus. Tiflis : 4 ♂, 18 ♀ (Caucasus).

This species is very similar to *P. connexa*, but its shining black rostrum and its very long and slender titillators are very good specific characters.

[*P. Davidi* NAV.] (fig. 21, 22, 23).

Panorpa Davidi NAVÁS, Mem. Real Acad. Cienc. Barcelona, p. 415, fig. 19a, 19b (1908).



FIG. 21. — *Panorpa Davidi* ♂
(Museum Paris).

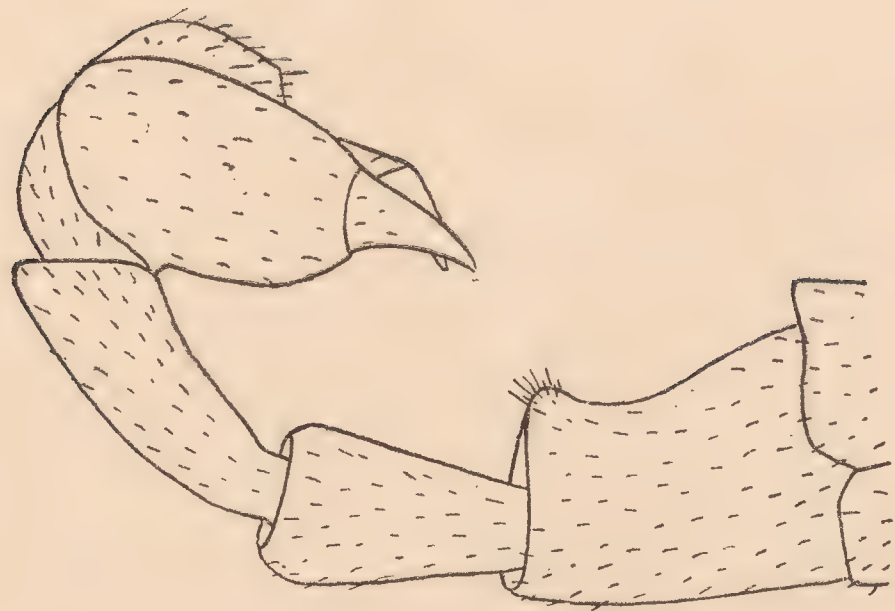


FIG. 22. — *Panorpa Davidi* ♂
Lateral view of abdominal segment
(Museum Paris).

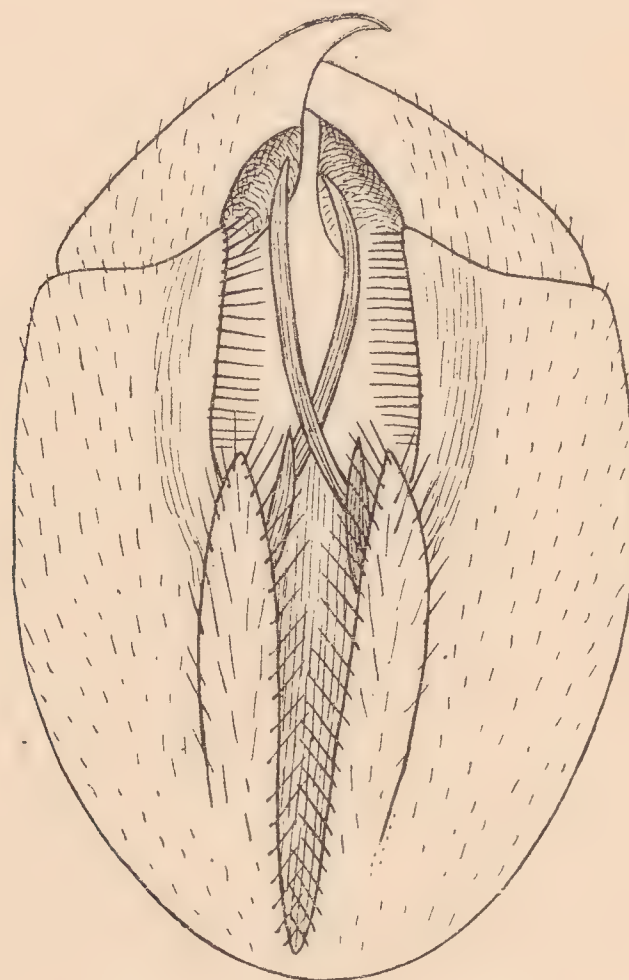


FIG. 23. — *Panorpa Davidi* ♂
Ventral view of terminal segment
(Museum Paris).

Head and eyes black; head with a reddish brown spot behind, touching the eyes. Rostrum reddish brown. The two basal joints of the antennae reddish brown; the rest of the antennae lost. Thorax black,

with a longitudinal median reddish streak. Abdomen blackish dorsally and ventrally. 7th, 8th and 9th segments testaceous. The 6th segment with a small, pale, haired notch on the dorsal tip. 7th and 8th segments much narrower than 6th and of equal length; the chelae short. Legs testaceous; the tarsal claws with dark small tips. Claws with 4 dents. Wings hyaline with a feeble yellowish tinge. Veins brownish; the greater part of cross veins in the apical half pale. Smb indicated by two spots. Abr absent. Ab rather large.

Forewing : 13^{mm}; hindwing : 11,5^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♂ Mou Pin, Tibet, 1870 (DAVID leg.) (type of NAVÁS).

[*P. sibirica* Esb.-Peters.] (fig. 24, 25, 26).

Panorpa sibirica ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 219 (1915).

Head and antennae black; rostrum shining brownish black. Thorax above, sides, coxae and abdomen black, the base of 7th and 8th segments brown. Legs yellowish brown, apical tip of tarsal joints dark brown.



FIG. 24. — *Panorpa sibirica* ♂
(Museum Hamburg).

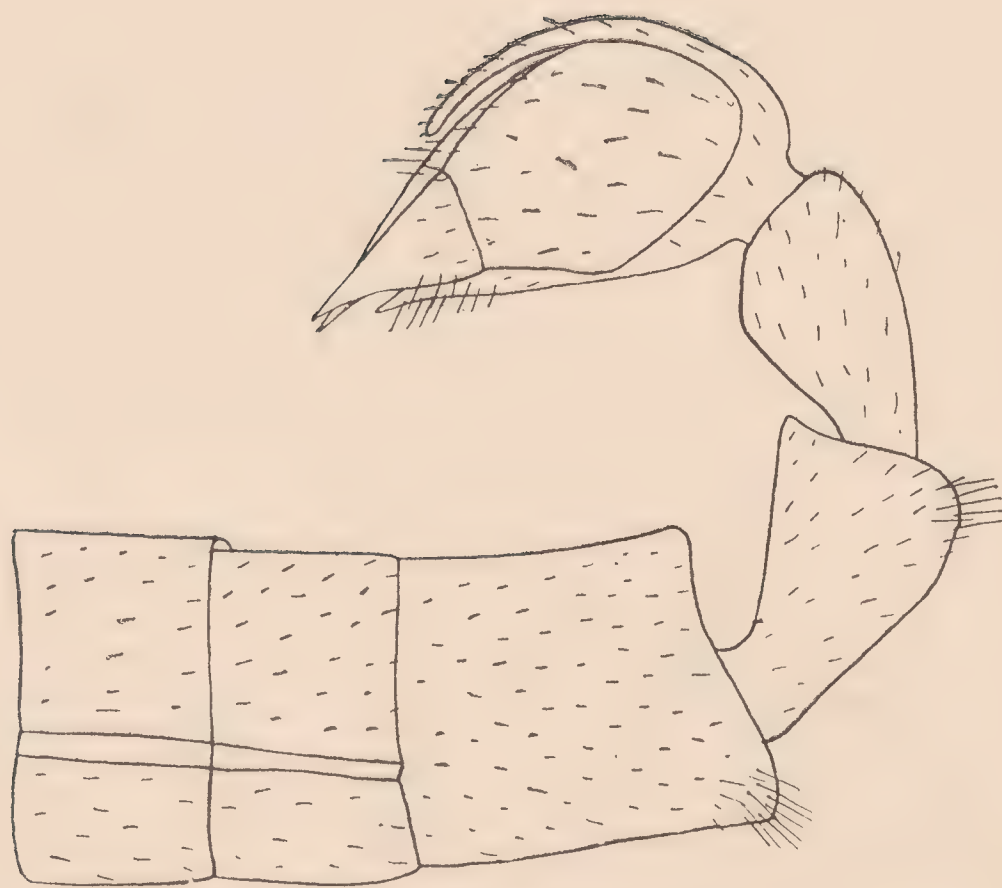


FIG. 25. — *Panorpa sibirica* ♂
Lateral view of abdominal segment
(Museum Hamburg).

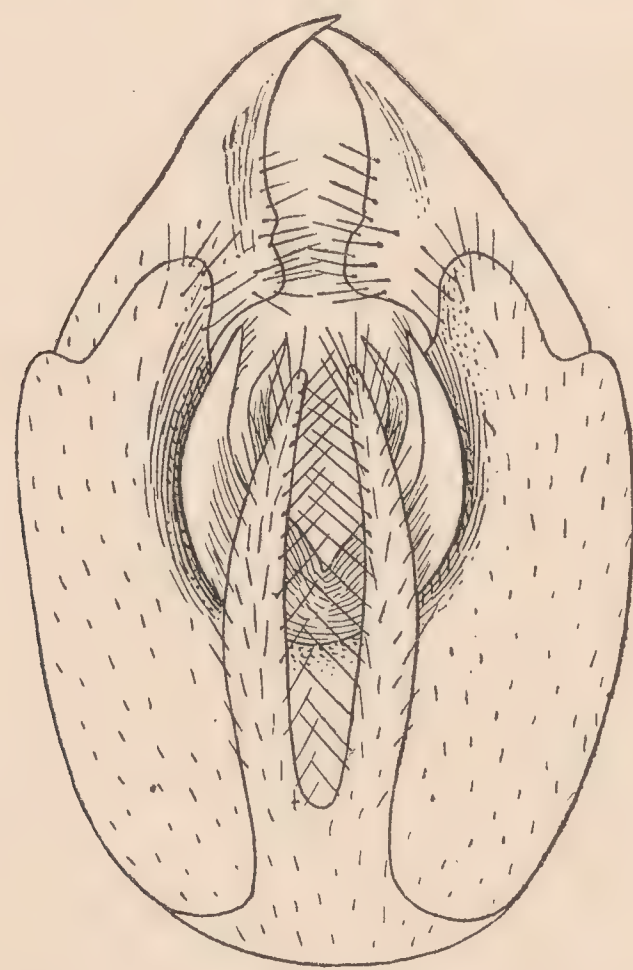


FIG. 26. — *Panorpa sibirica* ♂
Ventral view of terminal segment
(Museum Hamburg).

Claws serrate. 6th segment cylindrical, the apical margins somewhat incurved laterally; 7th segment conical, much broadened towards the apex; 8th conical with the apex above obliquely truncate. Branches of lower appendage long, flattened, almost straight and narrow towards the apex, which is obtuse. Titillators deeply cleft; the branches pointed towards the apex; the inferior pair smallest. The apex of upper appendage strongly haired and with a broad, deep and almost rectangular incision. Wings broad and short, with

somewhat acutely rounded apex. Membrane hyaline with lacteous tinge. Venation blackish brown. Markings sooty brown. In the forewings is found a spot in the middle of Cu^1 (the rest of Smb); Ptb narrow in its posterior half; Abr absent; Ab narrow in its posterior half.

Forewing : 14^{mm} ; hindwing : 13^{mm} .

Coll. SELYS : not present. — Mus. Hamburg : 1 ♂ Amur (DÖRRIES leg.).

[*P. stigmatis* Nav] (fig. 27, 28, 29, 30).

Panorpa stigmatis NAVÁS, Mem. Real Acad. Cienc. Barcelona, p. 416, fig. 20 (1908).

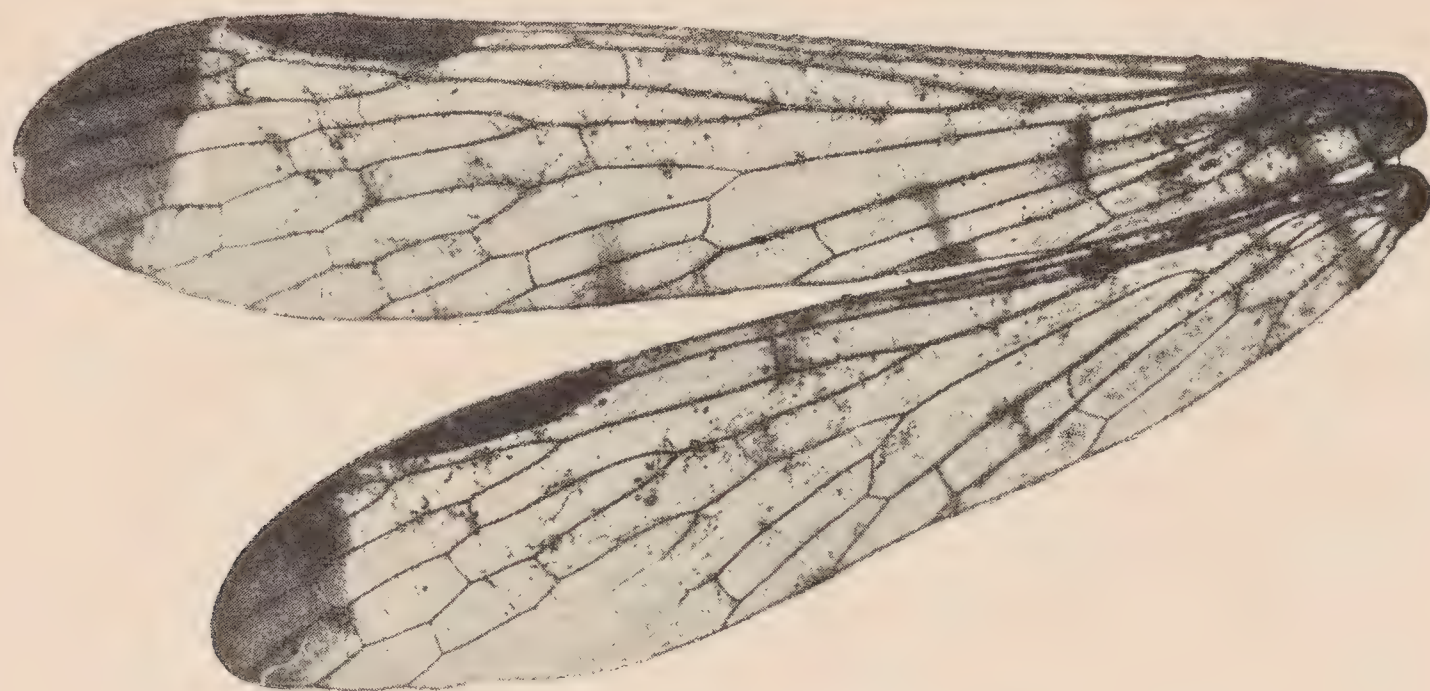


FIG. 27. — *Panorpa stigmatis* ♂
(Museum Paris).

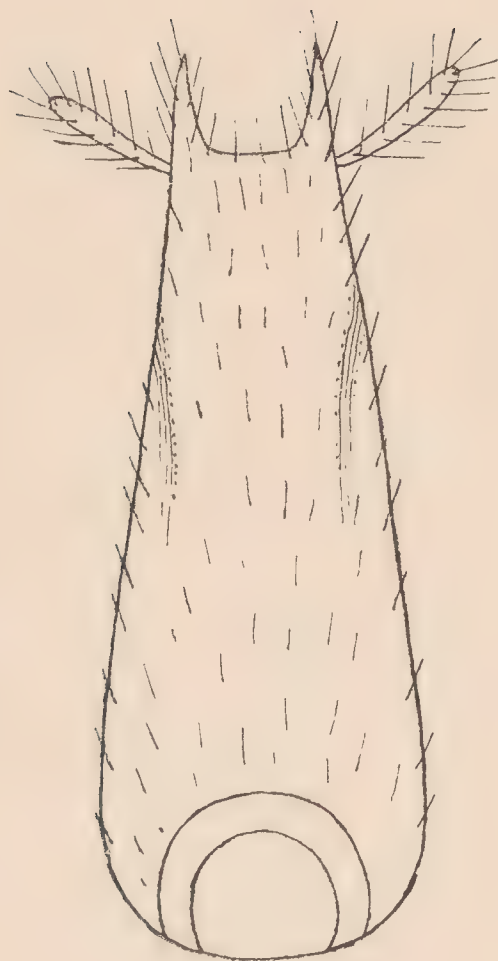


FIG. 28.
Panorpa stigmatis ♂
Upper appendage
(Museum Paris).

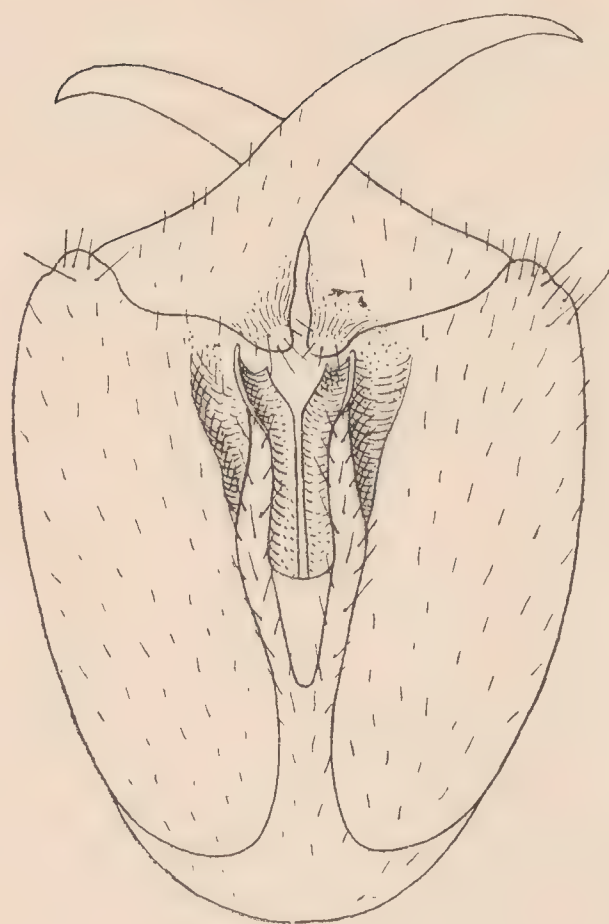


FIG. 29.
Panorpa stigmatis ♂
Ventral view of terminal segment
(Museum Paris).

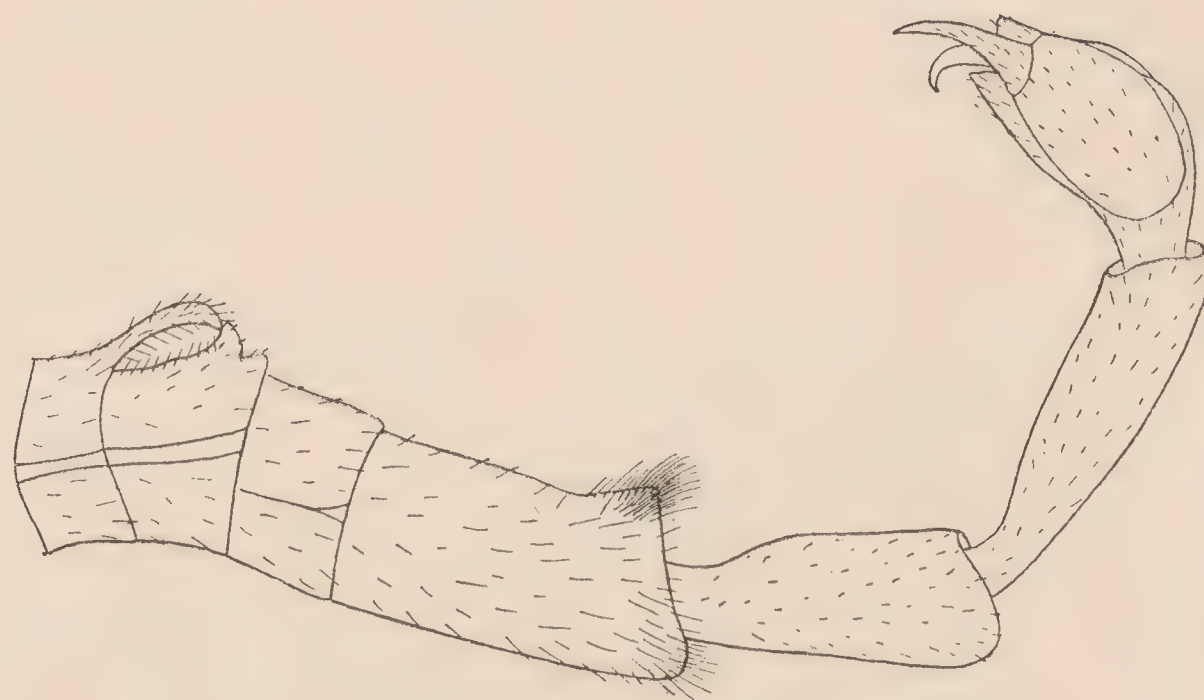


FIG. 30.
Panorpa stigmatis ♂
Lateral view of abdominal segments
(Museum Paris).

Head and rostrum brown; a blackish spot encloses the ocelli; rostrum blackish at the apex; maxillary palpi brown. Antennae brown at the base, darker towards the tip. Thorax black on the dorsum and sides; prothorax with spines along the front border. 2nd and 3rd abdominal segments black above; 2nd segment also black on the venter; the other abdominal segments brownish red. Legs yellowish brown; the tip of tarsal joints blackish. Claws serrate internally. Wings long and narrow, elliptical at the apex and with a strong yellowish tinge. Veins yellowish brown. Pterostigma conspicuous, red. A narrow, smoky brown cross band indicated in the forewing; Ab broad, smoky brown. In the forewing is found a narrow, smoky brown streak, extending from the place, where $1A$ joins the margin to C^1 .

Length of body : 22^{mm} ; forewing : 17^{mm} ; hindwing : 16^{mm} .

Coll. SELYS : not present. — Mus. Paris : 1 ♂ Mou Pin, Tibet (DAVID leg.) (type of NAVÁS).

[**P. concolor** Esb.-Peters.] (fig. 31).

Panorpa concolor ESBÉN-PETERSEN, Ent. Medd. København, p. 220 (1915).



FIG. 31. — *Panorpa concolor* ♀
(Museum London.)

Head brown; a black streak between the eyes above the antennae; rostrum castaneous with paler side margins; maxillary palpi brown, the tip of apical joint black. Antennae blackish, the basal joint yellowish brown. Thorax blackish; the hind borders of the thoracical segments brown. Sides of thorax greyish brown. Abdomen dorsally and ventrally blackish brown; the three terminal segments reddish brown; setae black. Legs brown; the tips of tarsal joints darker. Claws serrate. Wings with a smoky green tinge, blackish brown venation, dark greyish brown pterostigma and with acute tips. No markings except a very faint indication of a pterostigmatical band.

Forewing : 15^{mm}; hindwing : 14^{mm}.

Coll. SELYS : not present. — Mus. London : 2 ♀ Tainan, Anping, S. Formosa 1907 (WILEMAN leg.).

[**P. guttata** Nav.] (fig. 32).

Panorpa guttata NAVÁS, Mem. Real Acad. Cienc. Barcelona, p. 416 (1908).

Panorpa Davidi ♀ NAVÁS, ibid., p. 415, fig. 19c.

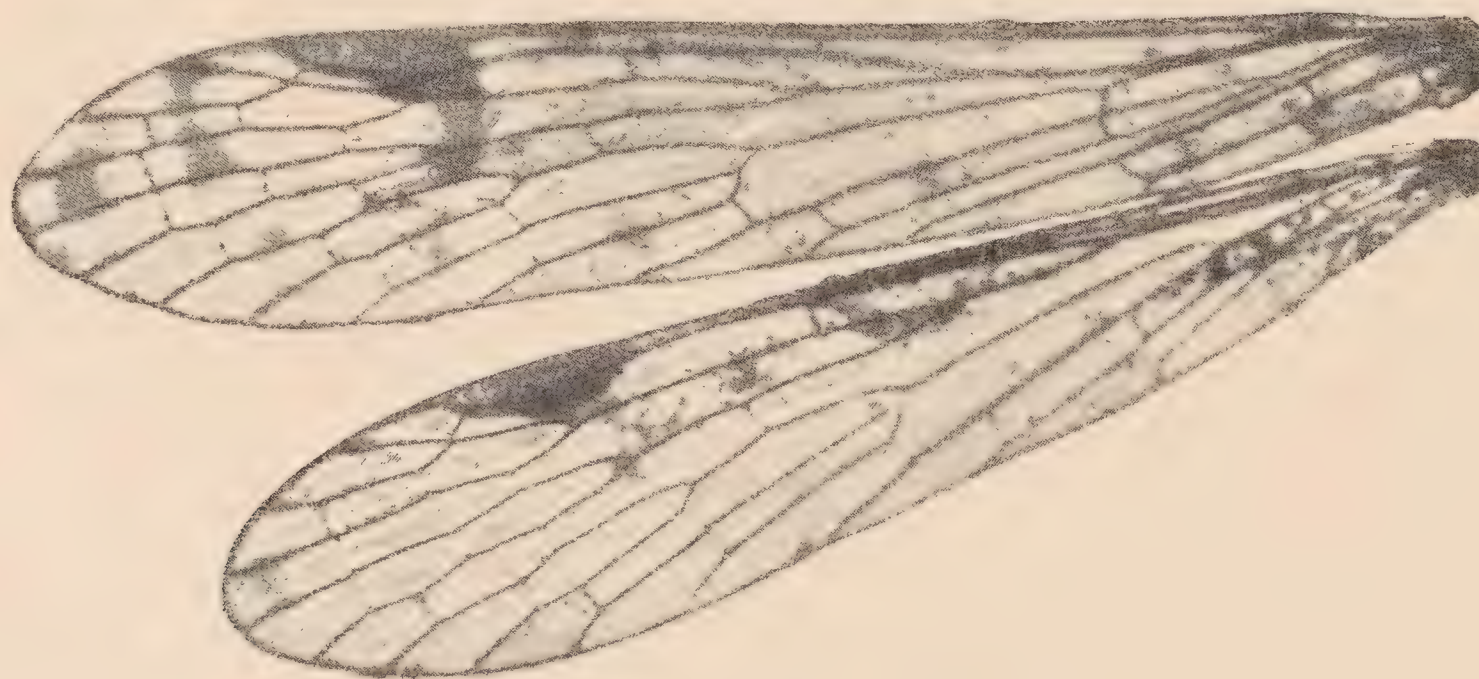


FIG. 32. — *Panorpa guttata* ♀
(Museum Paris).

Head and rostrum greyish testaceous. A blackish spot between the ocelli. 1st joint of antennae greyish testaceous, 2nd brownish black; the following ones pale greyish brown becoming dark brown towards the apex. Thorax and abdomen pale castaneous; venter and coxae pale greyish yellow. Legs brownish yellow;

tip of tibiae and of tarsal joints narrowly brown. Wings hyaline with a faint yellowish tinge. Veins brownish. Pterostigma yellowish. Ptb indicated by a spot at the pterostigma.

Forewing : 12,5^{mm}; hindwing : 11^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♀ Mou Pin, Tibet, 1870 (DAVID leg.) (type of NAVÁS).

NAVÁS has described the specimen as the female of *P. Davidi*. The form and markings of the wings show that they belong to different species, what also NAVÁS supposed, since he proposed the name *guttata*.

P. arcuata Nav. (fig. 33) (plate I, fig. 12).

Estenalla arcuata NAVÁS, Revue Russe d'Entom., XII, p. 356, fig. 1a, 1b (1912).

Head and rostrum yellowish brown; a small black spot on the vertex, enclosing the ocelli. Maxillary palpi yellowish brown, the tip of apical joint black. Thorax brownish yellow on the sides, testaceous on the dorsum with an indistinctly limited greyish brown median streak. Abdomen blackish brown above with yellowish brown hind margins; the venter greyish

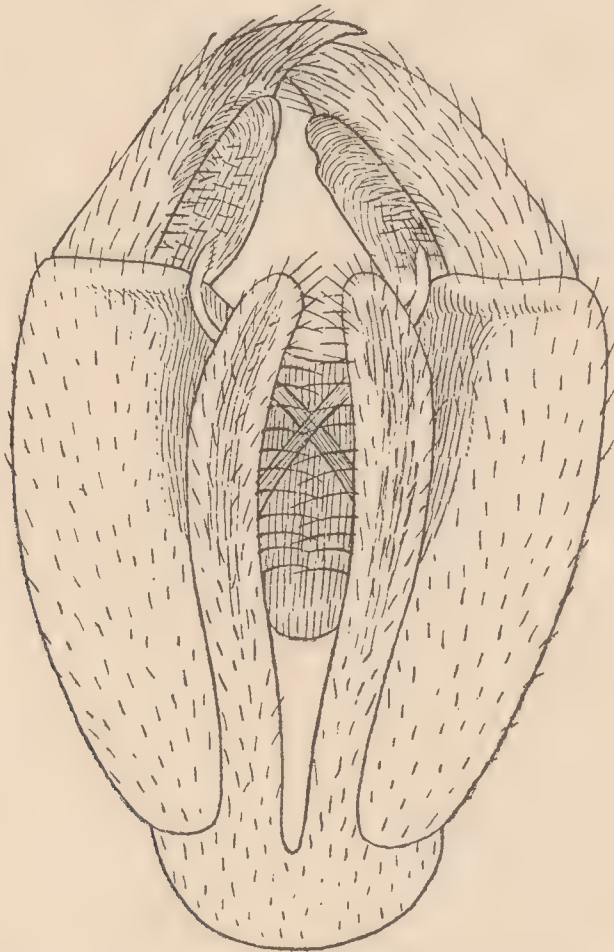


FIG. 33. — *Panorpa arcuata* ♂
Ventral view of terminal segment
(Coll. Selys).

yellow with the exception of 6th segment, which is blackish brown in the basal half. The three terminal segments brownish yellow. The abdomen pale yellowish haired. In the male the hind margin of third segment above is somewhat produced; 6th segment cylindrical, narrow towards the apex, which is obliquely truncate above. 7th and 8th elongate, somewhat cone-shaped; 9th somewhat flattened. Chelae very broad in the basal half, with a broad, blunt dent nearly in the middle; the apical half pointed and curved. Branches of lower appendage long, linear, flattened, slightly dilated towards the apex, which is rounded. Underside with blackish bristles, which are directed inwards. Apex of upper appendage very deeply incised. Titillators very long, slender, pointed and crossing each other. Legs yellowish; tips of tarsal joints brown. Wings elongate, hyaline with a faint yellowish tinge, blackish brown longitudinal veins and paler cross veins in the apical part. Only a few markings, which are pale sooty brown. No Bsp; Smb absent in hindwing, in forewing indicated by a small spot near the hind margin; Msp not present; Ptb present as a wedge-shaped spot at the front margin and a small one at the hind margin; Ab generally very narrow, enclosing some hyaline spots. Pterostigma yellowish.

Forewing : 14-15^{mm}; hindwing : 13-14^{mm}.

Coll. SELYS : 1 ♂ Kaketie (labelled « transcaucasica SELYS »). — Coll. NAVÁS : 1 ♂, 1 ♀ Souchoum, Caucasus (types of NAVÁS). — Mus. Tiflis : 2 ♂ Jurjevskoje (VORONOV leg.)

P. alpina Ramb. (fig. 34).

Panorpa alpina RAMBUR, Hist. Nat. Ins. Névr., p. 330 (1842). — MAC LACHLAN, Trans. Ent. Soc. London, p. 62, pl. IV, fig. 1a, 1b (1869). — WALLENGREN, Svenska Vetensk. Akad. Handl., p. 72 (1871). — MAC LACHLAN, Revue d'Ent., p. 8 (sep.) (1884) (Vosges). — ROSTOCK, Neuroptera germanica, p. 115 (1888). — ALBARDA, Cat. rais. syn. Névr., p. 112 (1889). — DZIEDZIELEWICZ, Sprawozd. Kom. fizyogr., p. 25 (1894) (Galicia). — ID., ibid., p. 40 (1911). — KŁAPÁLEK, Rozp. Cesk. Akad. Cisare Frantis Josefa, p. 18, pl. I, fig. 5; pl. II, fig. 5 (1896). — HEYDEN, Ber. Senck. Nat. Ges., p. 111 (1896). — STROBL, Mitt. nat. Ver. Steiermark, p. 241 (1905). — KEMPNY, Bull. Soc. Scienc. Bucarest, p. 672 (1906) (Roumania). — MONTANDON, ibid., p. 678 (1906).

Aulops alpina ENDERLEIN, Zool. Anz., XXXV, p. 390 (1910).

Panorpa variabilis BRAUER, Neuropt. austr., p. 35 (1857). — HAGEN, Ent. Zeit. Stettin, XX, p. 133 (1858) (Ural). — MEYER-DÜR, Mitt. Schweiz. Ent. Ges., IV, p. 358 (1874). — SCHOCH, Neur. Helv. Planip., pp. 11 (1885).

Head blackish above; rostrum brown. Antennae pitchy black; the two basal joints brown. Thorax brownish black to pitchy black; meso- and metathorax with a pale median

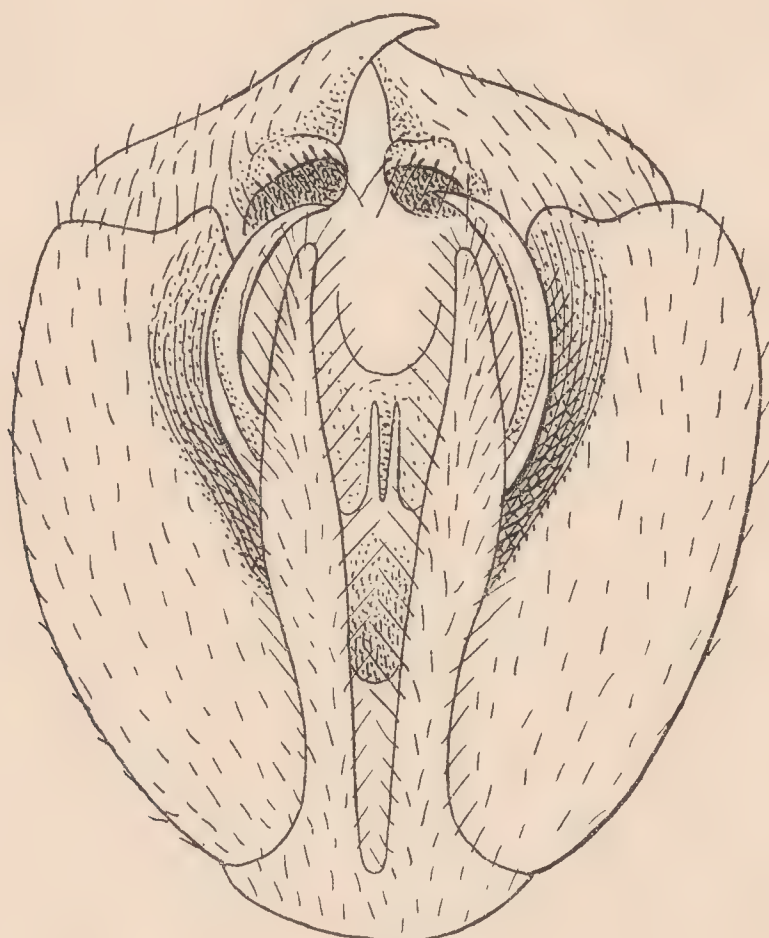


FIG. 34. — *Panorpa alpina* ♂
Ventral view of terminal segment
(Coll. Selys).

streak. Abdomen dorsally pitchy brown; the three terminal segments and the venter of the others paler. Legs yellowish brown; the tip of tibiae and of tarsal joints blackish. Claws serrate. In the male the third abdominal segment is produced into a flap in the middle of its apex above. The sixth a little narrowed from base to apex. Seventh and eighth cone-shaped, each of them as long as the sixth segment. Branches of lower appendage very long, flattened, parallel from base to the middle, where they are broadest; from the middle to the apex they are somewhat divergent; their apices are often hidden below the tip of the titillators. Upper appendage short, broad, narrow towards the apex, which is truncate and has a deep, somewhat rectangular incision. The claspers very broad; chelae short, broad at the base. Titillators long and curved. Wings hyaline with a faint yellowish tinge. In the male are only very few markings: Two brownish black pterostigmatical spots; a larger one in the basal part and a

smaller apical one. Behind the former a few minute ones in the forewings. In the female several smaller spots besides the pterostigmatical ones, especially in the apical part of the forewings.

Forewing : 11-14^{mm}; hindwing : 10-13^{mm}.

Coll. SELYS (Belgian coll.) : 5 ♂, 17 ♀; (general coll.) : 1 ♂ (RAMBUR's type, the terminal segments lost), 1 ♂ (H. ¹⁵/₆), 1 ♀ (H. ²⁰/₆). — Mus. Berlin : 1 ♂, 1 ♀ (Ural).

The species is found in mountainous districts in Central and East Europe. In my own collection I have a couple from the Carpathian mountains (Worochta, DZIEDZIELEWICZ leg.), in which the wings are stronger marked with sooty black spots, also in the male. The ninth segment in the male is very stout, but I have not been able to find any other structural difference.

[**P. pura** Klap.].

Panorpa pura KLAPÁLEK, Bull. intern. l'Acad. Bohême, p. 4, fig. 4 (1906).

« Kopf, Pro-, Meso- und Metanotum schwarz. Meso- und Metanotum auf dem Schildchen mit undeutlicher, rötlicher Zeichnung, Rüssel rötlich gelbbraun, gegen die Spitze zu etwas dunkler, mit undeutlichen Längsstreifen. Fühler schwarzbraun, Brust und Beine gelbbraun, Füße gegen die Spitze zu dunkler. Auf dem Hinterleibe sind die 6 ersten Segmente schwarz mit gelbbrauner Seitenlinie auf den vorderen fünf Ringen; die Hinterleibsspitze von 7. Segmente angefangen ist rötlich gelbbraun. Flügel sind schwach gelblich mit starken braunen Adern, und mit kaum kenntlichem Pterostigma; sie entbehren jeder Zeichnung, nur am Vorderrande und Hinterrande des Pterostigma ist ein kleiner Fleck. Die Subcosta mündet in die Costa etwa in der Flügelmitte.

Beim ♂ ist der 3. Ring ähnlich wie bei *P. germanica* auf dem Rücken am Hinterrande in einen kurzen beborsteten Fortsatz verlängert. Der 6. Ring ist nach hinten mässig verschmälert und etwas schief abgeschnitten; der 7. Ring ist deutlich verkehrt kegelförmig sowie auch der achte, welcher aber hinten deutlich schief abgestutzt ist. Forceps in der Seitenansicht stark gewölbt, von vorne gesehen breit eiförmig. Die Aeste der Gabel des IX. Ringes breit, flach an der Spitze abgestumpft und das Ende des ersten Forcepsgliedes nicht erreichend; die Farbe der Gabel ist dieselbe wie des ganzen Forceps, nur die Spitze ist etwas dunkler. Auf dem Rücken ist der IX. Ring verlängert und ähnlich wie bei *P. alpina* ausgeschnitten, es scheint aber dieser Ausschnitt etwas seichter zu sein. Titillatoren sind lang schmal einfach, aber divergieren nicht bogenförmig wie bei *P. alpina* sondern ragen parallel neben einander gerade nach hinten. Flügelspannung 24^{mm}. Das ♀ unbekannt. » (The specimen has been captured at Buczecz.)

Coll. SELYS : not present.

I have not seen specimens of this species, and therefore I give the original description of KLAPÁLEK.

P. caucasica Mac Lachlan (plate I, fig. 7).

Panorpa caucasica MAC LACHLAN, Trans. Ent. Soc. London, pp. 59-70, pl. VI, fig. 2a, 2b (1869). — Id., Ann. Soc. Ent. Belg., XII, p. 103 (1869).

Head, antennae, rostrum, maxillary palpi, thorax, femora and abdomen jet black. In the male the base of 7th and 8th segment somewhat blackish brown. Apex of femora, tibia and basal joint of tarsi sooty black; the terminal joint of tarsi black. Claws serrate. In the male the 6th segment is long, cylindrical and narrow towards apex. 7th and 8th exceedingly long, very narrow at the base and gradually and regularly dilated towards the apex; 7th with a distinct tubercle at the extreme base above. Branches of lower appendage long, slender, somewhat pointed at the tip and divergent in their apical half. Chelae very long. Wings hyaline, without suffusion of any colour. Longitudinal veins black, cross veins paler in the apical half. Markings brownish black. Bsp present in forewing; Smb broad and generally abrupt, forming a large anterior spot and a smaller posterior one; Msp elongate; Ptb very broad, extending from

the costa half way across the wing, and then emitting two narrow curved branches to the posterior margin; Ab divided into two spots, the largest one in the extreme apex.

Forewing : 12-13^{mm}; hindwing : 11-12^{mm}.

Coll. SELYS : 1 ♂, 2 ♀ Persath (DEYROLLE leg.), 1 ♀ Bagdad (DEYROLLE leg.) (types of MAC LACHLAN).

In the ♀ from Bagdad, which in every respect agrees with the other three specimens, Sc joins the costa at the pterostigma.

[**P. diceras** Mac Lachlan].

Panorpa diceras MAC LACHLAN, Ann. Mag. Nat. Hist., XIII, p. 423 (1894).

« Body pale orange-yellow, with black markings as follows : on the head is a large spot in which the ocelli are placed, continued as a fine line between the basal joints of the antennae and expanded into a triangle on the front below them; rostrum with two lines gradually convergent towards the apex; a line on either side of the body commencing on the prothorax and continued to the end of the fifth abdominal segment, broadest on the basal segments.

Antennae and palpi black. Legs greyish yellow, with short blackish pubescence; tips of tarsal joints blackish, the last two joints of the intermediate and posterior tarsi nearly wholly blackish; spurs piceous; claws testaceous, with three or four long comb-like teeth within.

Wings moderate, subobtusate, dusky hyaline, the extreme apex fuliginous; otherwise without markings, save that the pterostigma is yellowish and rather long. Subcosta not extending to the pterostigma in either pair. Neuration black; but the transverse nervules appear whitish in certain lights, as also does the base of the furcation of the upper cubitus.

Abdomen short, with fine silky whitish pubescence; all the segments to the fifth transverse. Third dorsal segment slightly produced into a rounded flap in its middle, apparently covering a cavity in the anterior portion of the fourth; sixth segment as long as the fourth and fifth united, oblong; the middle of its posterior end above is produced into two short, strong, cylindrical, obtuse, slightly divergent horns; seventh longer than the sixth, obconical, curved upwards, excised and narrowed at its base about the length of the seventh, narrowly obconical, straight; cheliferous segment short, the lateral pieces strongly rounded, the chelae shorter than the segment, turned inward and crossing; on the inner end of each is a tooth about the middle, after which the apical portion is excised, and there are probably one or two inner teeth at the extreme base; appendages flattened, closely applied to the edges of the rounded sidelobes, gradually dilated to near the apical portion, which is oblique inwardly, the inner edge with a fringe of rather strong distant black hairs (the whole cheliferous segment is more dusky in colour than those preceding it, and on its inner, or upper side if extended, is an appearance as of two long yellow hairy processes, damaged in the individual before me). Expanse : ♂, 30^{mm}. »

Coll. SELYS : not present.

I have not seen this species, which is described from a specimen captured at Ta-chien-lu, Western China, on the frontier of Thibet.

Japanese-East Asiatic species.

The species can also be divided into two groups as to the length of Sc in the forewing. The division in which Sc as a rule joins the costa in the pterostigmatal region contains only the *cornigera*-group (*cornigera*, *Galloisi*, *gokaensis* and *arakavae*). The other division in which Sc in the forewing joins the costa before the pterostigma contains several groups. The *Wormaldi*-group (*Wormaldi*, *multifasciaria*, *striata*, *hakusanensis*, *Preyeri*, *bicornuta*, *leucoptera*) is recognized by its very short abdomen in the male; the 6th, 7th and 8th segments proportionally only a little longer than the preceding segments; markings of wings as a rule irregular. In the *japonica*-group (*japonica*, *nipponensis*, *ochraceopennis*, *Klugi*, *obscura*,

trizonata, *Lewisi*, *orientalis*, *sachalinensis*, *approximata*, *amurensis*) the markings of the wings are generally of regular form and very distinct. In the male 6th, 7th and 8th segments long and stout; the branches of lower appendage often very short. The species *Takenouchii* forms a group, remarkable by the peculiar markings of the wings and the very long prolongation of 3rd abdominal segment in the male.

P. Wormaldi Mac Lachlan (fig. 35, 36) (plate I, fig. 11).

Panorpa Wormaldi ♀ MAC LACHLAN, Trans. Ent. Soc. London, p. 186 (1875). — ♂ MIYAKÉ, Journ. Coll. Agric. Imp. Un. Tokyo, p. 202, pl. XI, fig. 8a, 8b (1910). — ID., ibid., p. 358, pl. 31, fig. 14, pl. 36, fig. 18 (1913).

Head and eyes jet black. Rostrum yellowish brown. Maxillary palpi brownish; the tip of apical joint brownish black. Antennae basally pitchy black, apex brownish. Thorax dorsally jet black, laterally and ventrally yellowish brown. Abdomen brownish black; venter of second to fifth segment brownish. Ninth segment rufous; the venter somewhat blackish in the middle.

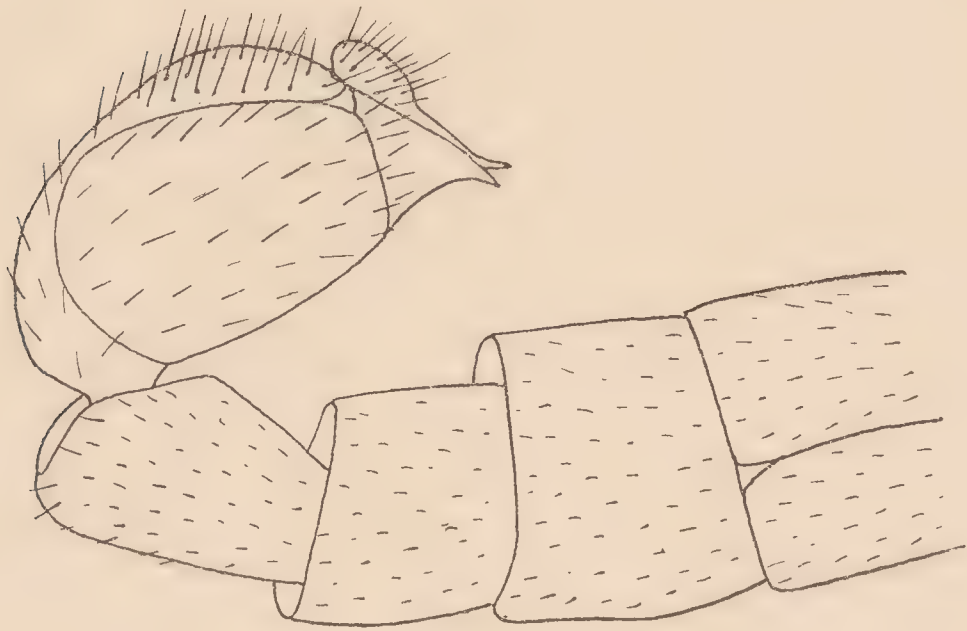


FIG. 35. — *Panorpa Wormaldi* ♂
Lateral view of abdominal segments
(Coll. Selys).

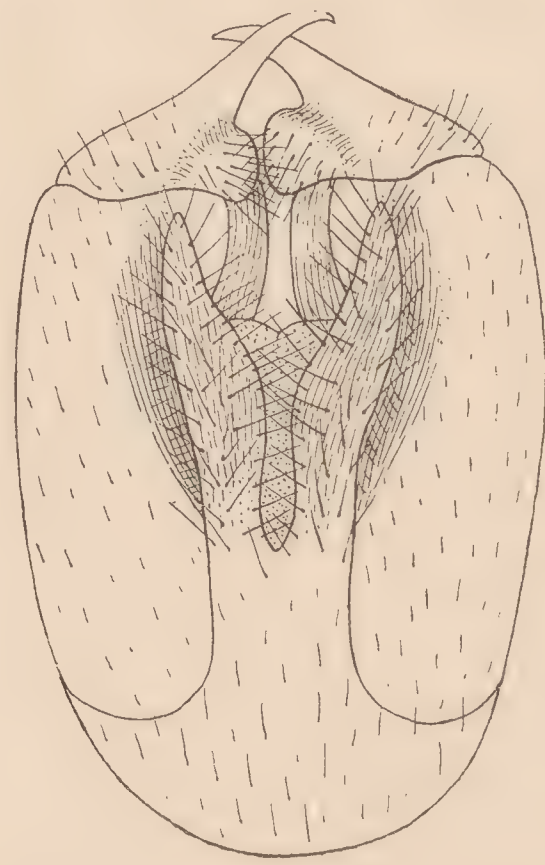


FIG. 36. — *Panorpa Wormaldi* ♂
Ventral view of terminal segment
(Coll. Selys).

Legs yellowish; the thip of tibiae and tarsal joints brownish. Claws serrate. Wings narrow and elongate, with elliptical apex, lactaceous with blackish brown markings. Along the costal margin a streak from base to apex; the posterior margin also with a streak in which three spots are placed. In the middle of the wing is a short transverse spot connected with the anterior streak. From the pterostigmatal region two narrow transverse fasciae, each broadly furcated in its lower half. Beyond the second fascia is a simple linear fascia, and the apical dark portion is also very narrow. In the male the ventral lobes are stout and provided with long hairs; their inner margins much raised. Chelae short and with a large, much raised and blunt dent at the base internally.

Forewing : 13^{mm}; hindwing : 11^{mm}5.

Coll. SELYS : 1 ♂ Japan (PREYER leg.). — Mus. Paris : 1 ♂ Kofou (DROUARD leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Takao, 22, V, 12 (MIYAKÉ leg.); 1 ♂, 1 ♀ Mitake, 1, VI, 13 (NAKAHARA leg.).

P. multifasciaria Miy. (fig. 37, 38) (plate I, fig. 10).

Panorpa multifasciaria MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 196, pl. XI, fig. 5, 5a, 5b (1910). — ID., ibid., p. 360, pl. 36, fig. 20 (1913).

Vertex shining black; insertion of antennae and rostrum yellowish brown, the latter with a broad pitchy brown longitudinal median streak. Maxillary palpi yellowish brown; the apical joint with dark brown tip. Antennae blackish brown. Thorax black above, on the sides and venter yellowish. Abdomen in the female blackish above, becoming brown towards the

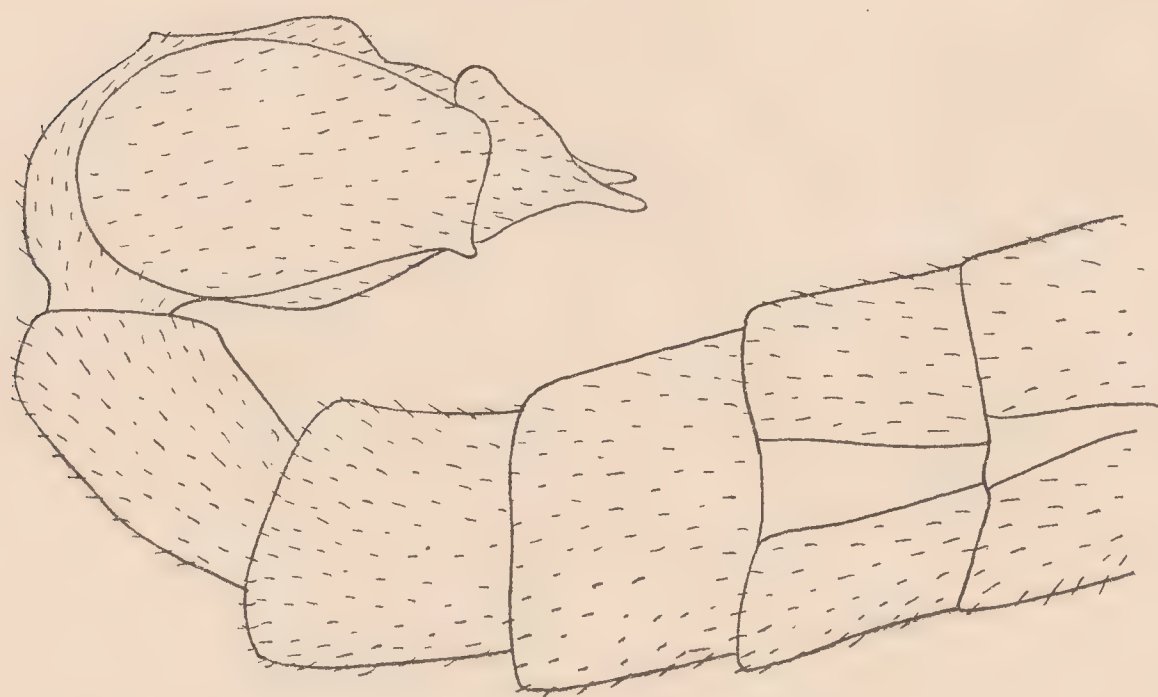


FIG. 37. — *Panorpa multifasciaria* ♂
Lateral view of abdominal segments
(Coll. Selys).

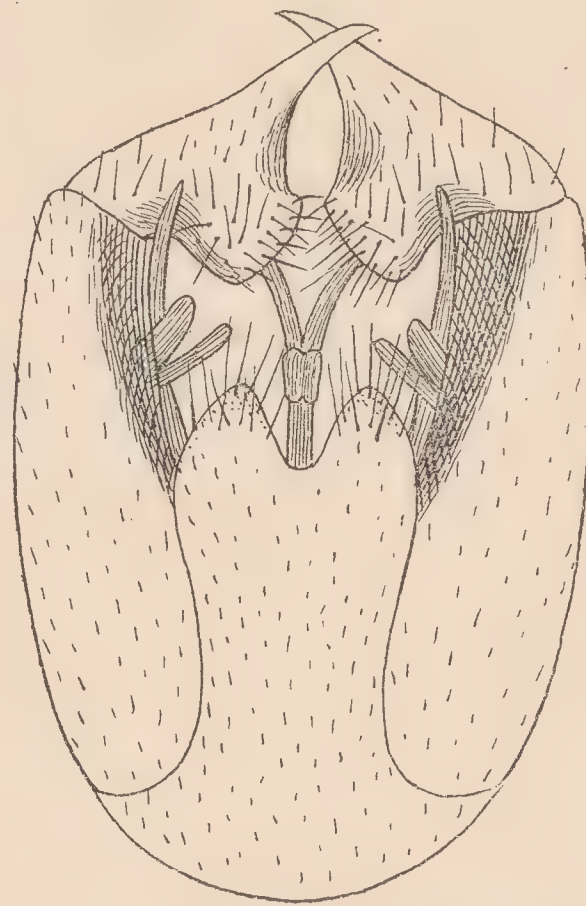


FIG. 38. — *Panorpa multifasciaria* ♂
Ventral view of terminal segment
(Coll. Selys).

apex; yellowish brown ventrally. 2nd to 6th abdominal segments in the male blackish dorsally, yellowish ventrally; the terminal segments yellowish brown. Tip of chelae brown. Hind border of third segment hardly produced. Branches of lower appendage very short. Legs yellowish; tip of tarsal joint brown. Wings whitish, elongate and with elliptical apex. The arrangement of the markings nearly the same as in *Wormaldi*.

Forewing : 14-15^{mm}; hindwing : 12-13^{mm}.

Coll. SELYS : 8 ♂, 7 ♀ Gifu, April-May 1887 (PREYER leg.). — Coll. ESBEN-PETERSEN, 1 ♀ Gifu, 29, V, 1908 (MIYAKÉ leg.).

[P. striata Miy.].

Panorpa striata MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 6, pl. I, fig. 1, 1a, 1b (1908). — ID., Journ. Coll. Agr. Imp. Univ. Tokyo, p. 359, pl. 36, fig. 19 (1913)

« Body black, the cheliforous segment ochraceous brown; rostrum black; antennae black; legs fuscous yellow.

Wings with elliptical apex, the hindwing somewhat shorter than the forewing; whitish, with black markings as follows: the subcostal vein with a streak from base to end; a small elongated spot connected transversally on the end of the vein; three conjoined spots along the posterior margin, which are in the hindwing less emphasized; an irregular fascia, broader than the others, beyond the middle of the wing; three elongated spots on the posterior margin between the two fasciae just mentioned; a curved line just before the apex; apex with a narrow dark portion; longitudinal veins brownish black; transverse veins mostly whitish.

Abdomen black, the posterior margin of the 3rd segment produced into a short median lobe; 6th segment larger than the others; 7th and 8th segment not so long as the others (except the first segment),

8th segment scarcely longer than the 7th; 9th segment stout; lateral pieces larger, fuscous yellow, the chelae very short, the appendages of the segment black, rounded, short and very broad in proportion to same of the species hitherto examined, the divided portions extremely short, the distal part of the appendages bent downwards between the two lateral pieces of the cheliferous segment (no such case in any other species) so that they represent a transverse ridge above. Expanse : 27^{mm} ».

Coll. SELYS : not present.

I do not know this species.

[*P. hakusanensis* Miy.] (fig. 39).

Panorpa hakusanensis ♀ MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 354, pl. 36, fig. 9 (1913).

Head shining black; rostrum shining black with a narrow brownish black lateral streak; maxillary palpi dark brown, the terminal joint with black apex. Antennae black at base, becoming pitchy brown towards apex. Thorax and abdomen black. Third abdominal segment with a broad and short prolongation at



FIG. 39. — *Panorpa hakusanensis* ♂
Lateral view of abdominal segments
(Coll. Esben-Petersen).

the hind margin above. Seventh segment deeply incised above; its hind margin laterally with a rounded prolongation. Branches of lower appendage broad, flattened, pointed towards apex, placed like a roof. Legs yellowish brown; coxae, base of femora, base and tip of tibiae and tip of tarsal joints blackish brown. Claws serrate. Wings elongate and with parabolic apex. Membrane lacteous with pitchy brown veins and pale sooty brown markings almost on the same plan as in *Preyeri*. Pterostigma strongly dark brown coloured.

Forewing : 16^{mm}; hindwing : 15^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♂ Japan (Miyaké leg.).

MIYAKÉ only describes the female. My specimen represents no doubt the unknown male. The species is a good and very distinct one, and the anal parts of the ♂ are quite different from those of *P. Preyeri*. It has, however, great likeness to that species as to markings of wings, but the markings are paler and not so distinct. The terminal segments are in some degree similar to those of *P. bicornuta* MAC LACHL., but the tip of the lateral prolongation of seventh segment is rounded, and the sixth segment is not narrowed towards the tip.

P. Preyeri Mac Lachl. (fig. 40, 41) (plate I, fig. 9).

Panorpa Preyeri MAC LACHLAN, Trans. Ent. Soc. London, p. 185 (1875). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 189 (1910). — Id., *ibid.*, p. 355, pl. 30, fig. 12; pl. 36, fig. 13, 14, 15 (1913).

Panorpa Preyeri var. *major* MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 11, pl. I, fig. 8 (1908).

Panorpa Bouvieri NAVÁS, Mem. Real Acad. Cienc. Barcelona, p. 418, fig. 24 (1908).

Panorpa leucoptera MIYAKÉ (nec UHLER), Journ. Coll. Agr. Imp. Univ. Tokyo, p. 356, pl. 31, fig. 13; pl. 36, fig. 16, 17 (1913).

Head shining black; the insertion of antennae, a median longitudinal streak and a narrow lateral streak on the rostrum yellowish. Maxillary palpi pitchy brown with paler annulations at the joinings. Antennae pitchy brown. Thorax black above, yellowish on the sides and below. In the female the abdomen is pitchy brown; the three terminal segments more or less yellowish brown, the venter greyish brown, becoming yellowish brown towards

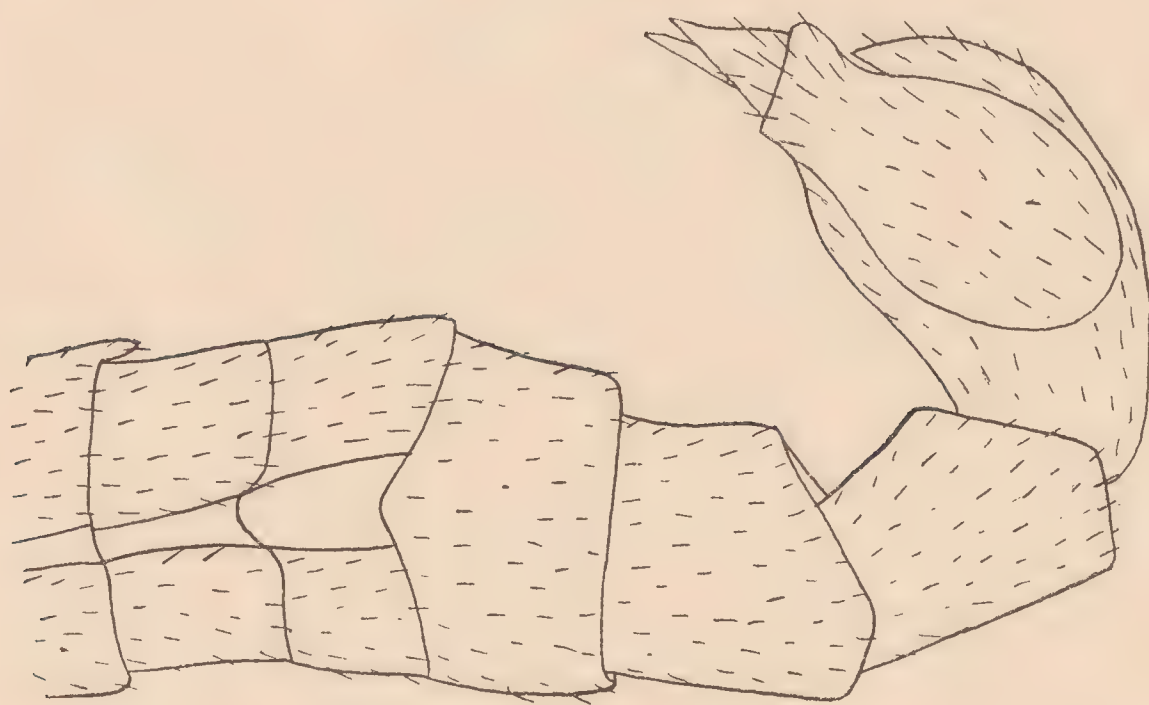


FIG. 40. — *Panorpa Preyeri* ♂
Lateral view of abdominal segments
(Coll. Selys).

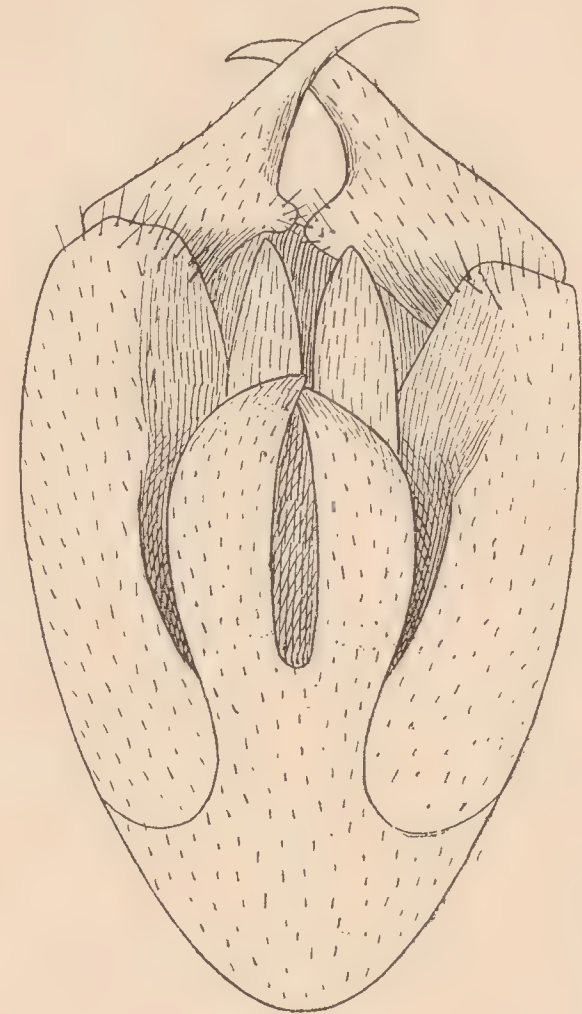


FIG. 41. — *Panorpa Preyeri* ♂
Ventral view of terminal segment
(Coll. Selys).

apex. In the male second to fifth abdominal segments are pitchy brown above, greyish brown below and with a yellow lateral streak; the terminal segments above and below more or less yellowish brown. Hind border of third segment above shortly and broadly prolonged. Branches of lower appendage flattened, pointed towards their tip; upper appendage narrowed towards its tip, which is rounded. Tip of chelae black. Legs yellowish brown, tips of tibiae and tarsal joints with a narrow pitchy brown band. Wings elongate, with elliptical apex, whitish and with yellowish white veins outside the sooty brown markings, in which the longitudinal veins are blackish brown.

Forewing : 17-19^{mm}; hindwing : 15-17^{mm}.

Coll. SELYS : 5 ♂, 12 ♀ Gifu, April-May 1887 (PREYER leg.); 1 ♂, 3 ♀ Yesso 1882 (PREYER leg.), 1 ♀ (103) and 1 ♂, 3 ♀ (104) (PREYER leg.). — British Mus. : 1 ♀ Japan. — Mus. Hambourg : 1 ♀ Japan (ex. coll. FRUHSTORFER). — Coll. ESBEN-PETERSEN : 3 ♀ Nikko (MIYAKÉ leg.).

The series from Gifu and 1 ♂ and 2 ♀ (104) in the Selysian collection are quite typical, but the specimens from Yesso and 1 ♀ (103), 1 ♀ (104) are very different as to the markings of the wings. The apical markings are not present; the pterostigmatal band only indicated by an oblique streak on the front margin. Of the longitudinal basal streaks only the costal one indicated by a few small spots. MIYAKÉ (*loc. cit.*) considers this form as *P. leucoptera*.

[*P. bicornuta* Mac Lachl.] (fig. 42, 43).

Panorpa bicornuta MAC LACHLAN, Bull. Soc. ent. Suisse, p. 403 (1887). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 190 (1910). — ID., ibid., p. 353, pl. 31, fig. 16; pl. 36, fig. 1, 2 (1913).

Panorpa magnicauda MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 192, fig. 6, 6a, 6b (1910).

Head and rostrum shining black. Maxillary palpi brownish; the tip of apical joint black. Antennae blackish at the base and becoming brownish black towards the apex. Thorax and abdomen of the female dorsally and ventrally black except the tip of the abdomen, which is blackish brown. In the male the

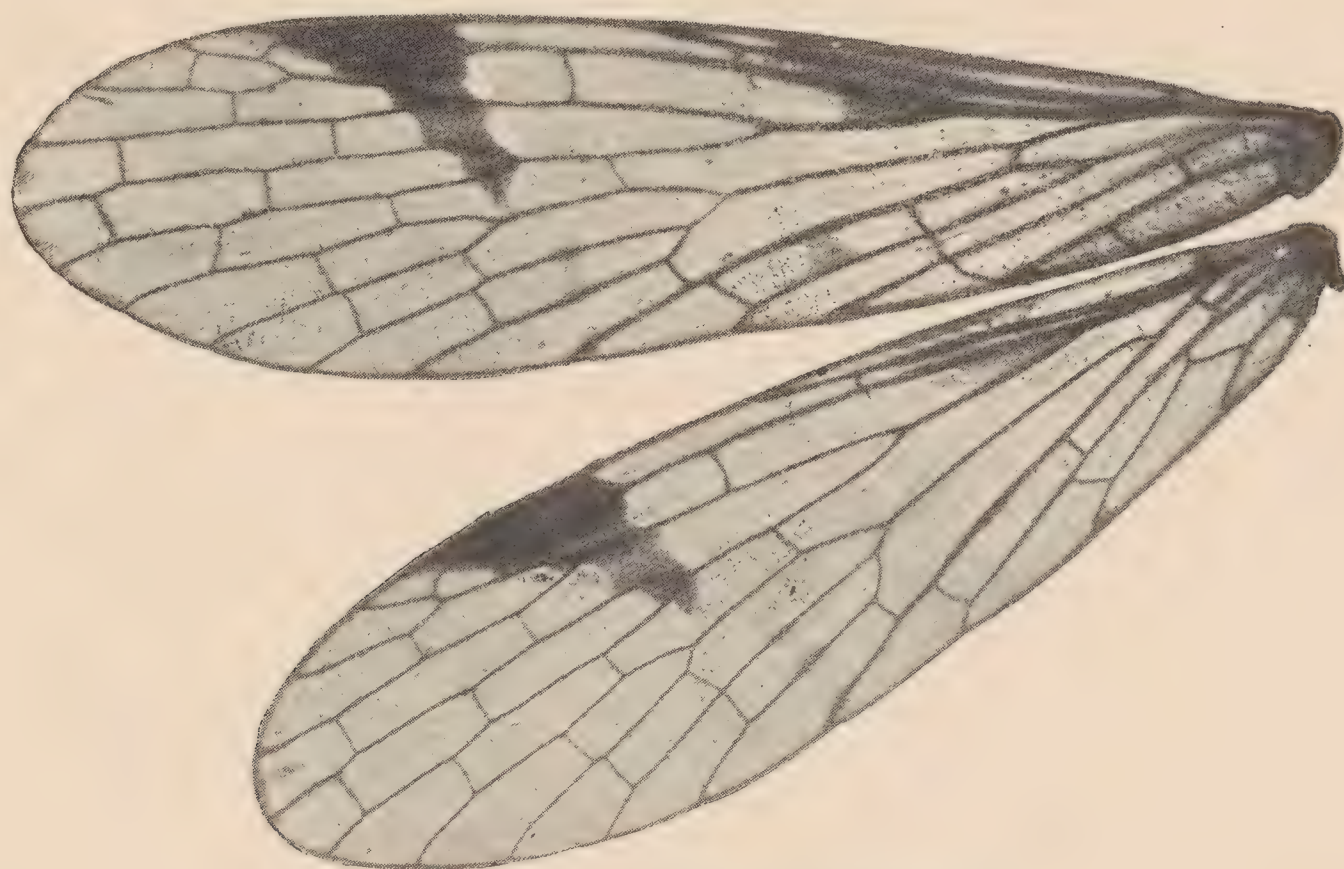


FIG. 42. — *Panorpa bicornuta* ♀
(Museum Paris).

posterior margin of third segment above with a broad semicircular prolongation, closely haired along the margin. Sixth segment only a little longer than fifth, cylindrical, narrowed towards the apex; seventh segment with a very deep incision above, in which the eighth segment is placed; at its hind margin the

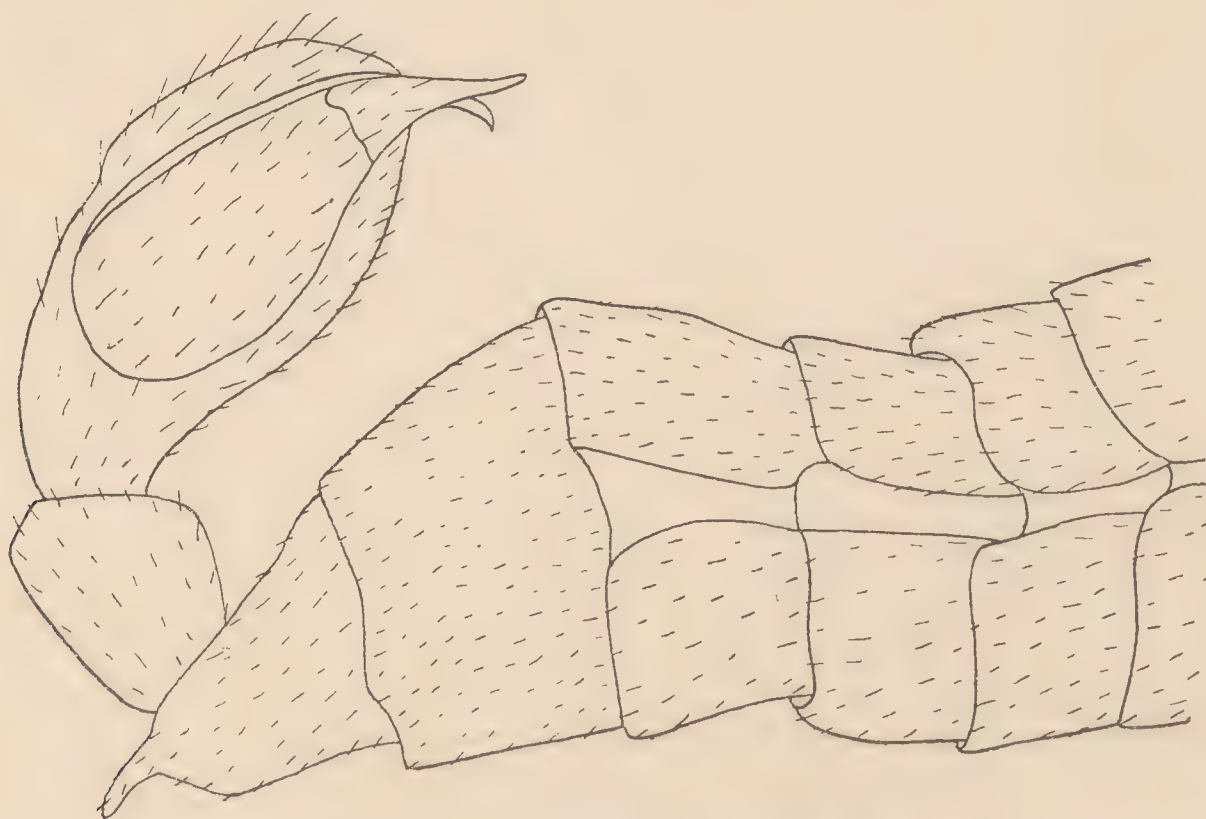


FIG. 43 — *Panorpa bicornuta* ♂
Lateral view of abdominal segments
(Coll. Miyaké).

seventh segment is laterally provided with a horn. Branches of lower appendage very long, flattened. Legs yellowish brown. Coxae, the base and the tip of femora, the tip of tibiae and of the three first tarsal joints blackish; fourth and fifth joints blackish. Claws serrate. Wings obtuse and lacteous. The longitudinal veins strongly dark brown. The basal cross veins dark brown, the apical ones paler. Markings of the wings as follows: A subtriangular, smoky brown spot, occupying the pterostigma and continued as an oblique line to

the middle of the wing; from there to the posterior margin the band is faintly indicated. At the anterior margin, half way between the base and the pterostigma, is found a subtriangular smoky brown spot. In the forewings a pale brownish spot is indicated between the branches of the media.

Forewing : 15,5^{mm}; hindwing : 14,5^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♀ Japan. — Coll. MIYAKÉ : 1 ♂ Japan.

[*P. leucoptera* Uhl.] (fig. 44).

Panorpa leucoptera UHLER, Proc. Acad. Nat. Sc. Phil., p. 31 (1858). — MAC LACHLAN, Trans. Ent. Soc. London, p. 186 (1875). — Id., Bull. Soc. Ent. Suisse, p. 402 (1884). — Id., Journ. Linn. Soc., p. 258 (1868).

Panorpa nikkoënsis MIYAKÉ, Bull. Coll. Agric. Imp. Univ. Tokyo, VIII, p. 11, pl. I, fig. 2 (1908). — Id., Journ. Coll. Agric. Imp. Univ. Tokyo, p. 364, pl. 36, fig. 4 (1913).

Head jet black above; the face, the insertion of the antennae and the rostrum brownish yellow; the tip of the apical joint of maxillary palpi darker. Antennae castaneous. Basal joint of antennae yellowish and stout, second joint smaller, as broad as long. Thorax yellowish. Prothorax with two black transverse lines, which are touching each other in the middle. Meso- and metathorax with a black spot at the base of the



FIG. 44. — *Panorpa leucoptera* ♀
(Museum Paris).

wings and with a short black line at each side of the hind margins. The dorsum of second to fifth abdominal segments castaneous with paler hind borders of the segments; a median spot near the front margin paler. The dorsum and venter of sixth to ninth segments yellowish brown. Setae black. Legs yellowish. The tip of tibiae and of tarsal joints dark brown. Claws serrate. Wings lactaceous with a faint yellowish tinge. The margins of the wings and the longitudinal veins blackish brown except the basal half of M, Cu² and in the forewings also of the anal veins, which are all pale yellowish or white. The cross veins pale, in certain light white. Along the anterior margin four blackish brown spots, the largest of which occupies the basal half of the pterostigmatal area. Along the hind margin of forewing four small spots; in the hindwing only one. The tip of wings narrowly brownish bordered. The apical half of pterostigma strongly yellowish.

Forewing : 16^{mm}; hindwing : 14,5^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♀ Nippon, 1906 (DROUART DE LEZEY).

I have not seen the male which has been described by Mac Lachlan in « Bull. Soc. ent. Suisse », 1887, p. 403 as follows :

« Chez le ♂ l'abdomen est très court et tous les segments sont transversaux. Le sixième est un peu plus court que le cinquième : mais de la même construction. Septième presque carré mais plus large que long, le bord postérieur un peu évidé latéralement. Huitième à peine plus long que le septième; en forme de cône

très court et presque oval; coupé obliquement et évidé au bout. Segment chélifère grand, oval, à pinces très courtes, à peine se croisant; brun au bout; vers la base des pinces il y a une grande dilatation presque carrée, mais coupée obliquement au bout. Appendices larges, aplatis, pressés l'un contre l'autre excepté à la base où ils sont écartés en laissant une excision en forme d'ovoïde entre les deux appendices; ils ne s'étendent pas jusqu'à la base des pinces. Les trois derniers segments sont jaune pâle ».

P. japonica Thunb. (fig. 45, 46).

Panorpa japonica THUNBERG, Nov. Ins. Sp. Dissert., III, p. 67, fig. 79 (1784). — BURMEISTER, Handb. Ent., II, p. 957 (1839). — WESTWOOD, Trans. Ent. Soc. London, p. 188 (1846). — MAC LACHLAN, Journ. Linn. Soc., IX, p. 256 (1868). — ID., Trans. Ent. Soc. London, p. 183 (1875). — MIYAKE, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 1 (1908). — ID., Journ. Coll. Agr. Imp. Univ. Tokyo, p. 347, pl. 30, fig. 14; pl. 35, fig. 1, 2, 3, 4, 5 and 6 (1913).

Panorpa japonica subsp. *macrogaster* MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 348 (1913).

Panorpa macrogaster MAC LACHLAN, Journ. Linn. Soc., p. 257 (1868). — ID., Trans. Ent. Soc. London, p. 184 (1875).

Panorpa leucothyria NAVÁS, Mem. Real. Acad. Cienc. Barcelona, p. 414 (1908) (Tien-Tsuen, China).

Panorpa dyscola ♀ NAVÁS, Mem. Real. Acad. Cienc. Barcelona, p. 420 (1908).

Panorpa sinanoensis MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 4, pl. I, fig. 7, 7a, 7b (1908).

Panorpa rectifasciata MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 5, pl. I, fig. 10, 10a, 10b (1908). — ID., Journ. Coll. Agr. Imp. Univ. Tokyo, p. 350, pl. 30, fig. 16; pl. 35, fig. 7 and 8 (1913).

Panorpa nipponensis MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 7, pl. I, fig. 3, 3a, 3b (1908).

Panorpa pulchra MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 8, pl. I, fig. 4 (1908). — ID., Journ. Coll. Agr. Imp. Univ. Tokyo, p. 349, pl. 30, fig. 17; pl. 35, fig. 4, 7 and 9 (1913).

Panorpa irregularis MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 198, pl. XI, fig. 7, 7a, 7b (1910).

Aulops interrupta NAVÁS, Revue Russe d'Entom., XIII, p. 283, fig. 11 (1913).

? *Panorpa Hageni* NAVÁS, Revue Russe d'Entom., IX, p. 276 (1909).

Head, thorax and abdomen deeply black, often shining. Antennae black. Legs yellowish or yellowish brown, the tip of tibiae and tarsal joints brown. In the male the hind border of third abdominal segment is produced into a short and broad lobe. Sixth segment cylindrical, seventh as long as sixth, but thinner, and its posterior angles somewhat produced, forming a triangular tooth; eighth much longer than seventh, slightly thickened towards the apex, which is obliquely truncate above. Wings broad, with rounded tips, with a more or less yellowish tinge and with sooty black markings. The veins blackish brown. The most common wing markings are : a broad apical band, the inner margin of which is somewhat concave; a broad pterostigmatal band and sometimes one or two spots before it. In some specimens the apical branch of the pterostigmatal band is present, either as a complete, curved streak or as a spot

at the hind margin; in other specimens are present the median spot and the submedian spot, either as a complete, oblique band or as one or two separated spots; at least in some strongly

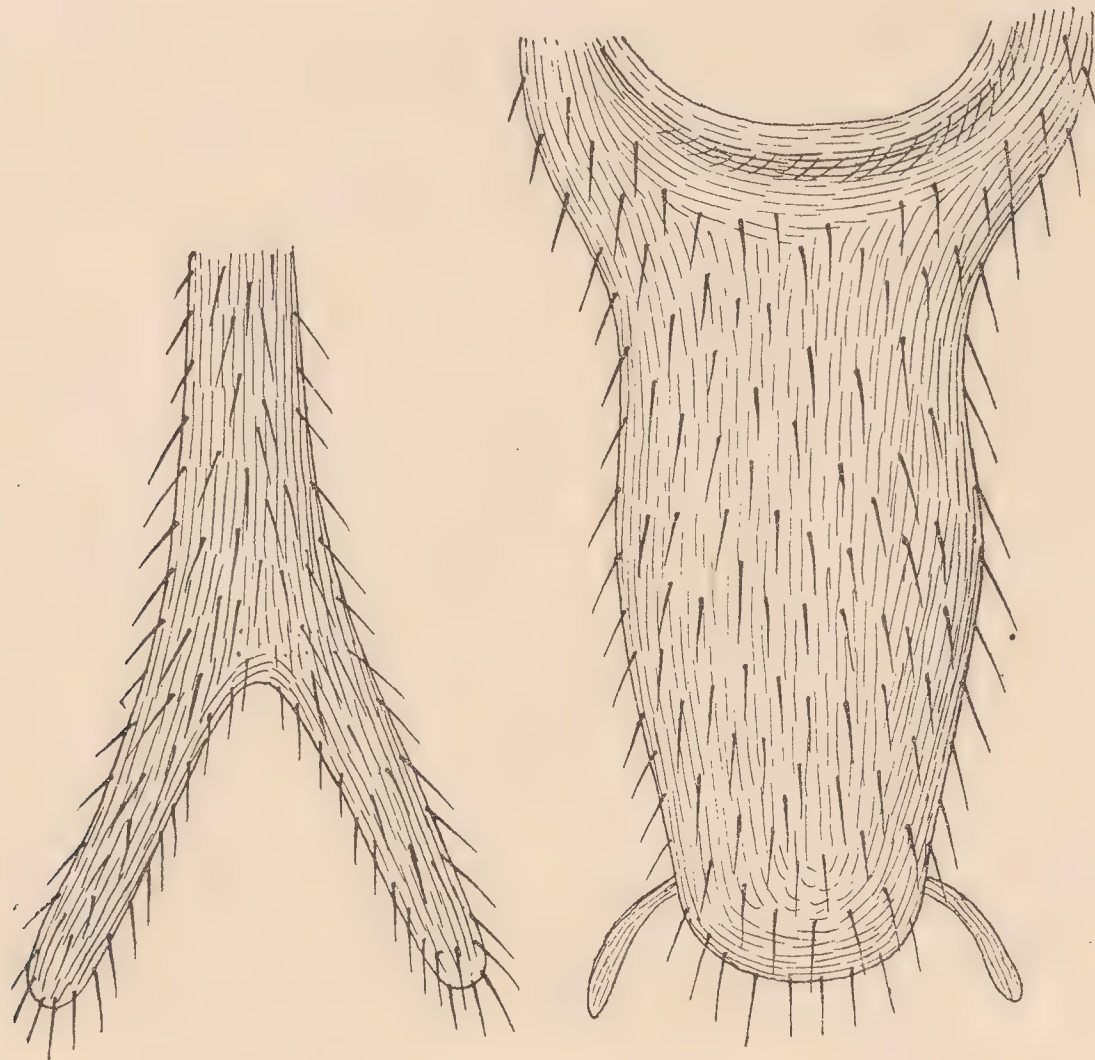


FIG. 45. — *Panorpa japonica* ♂
Lower and upper appendage.

marked specimens a basal spot, sometimes isolated and sometimes connected with the submedian band. In a few specimens the pterostigmatal band and the apical band may be traversed

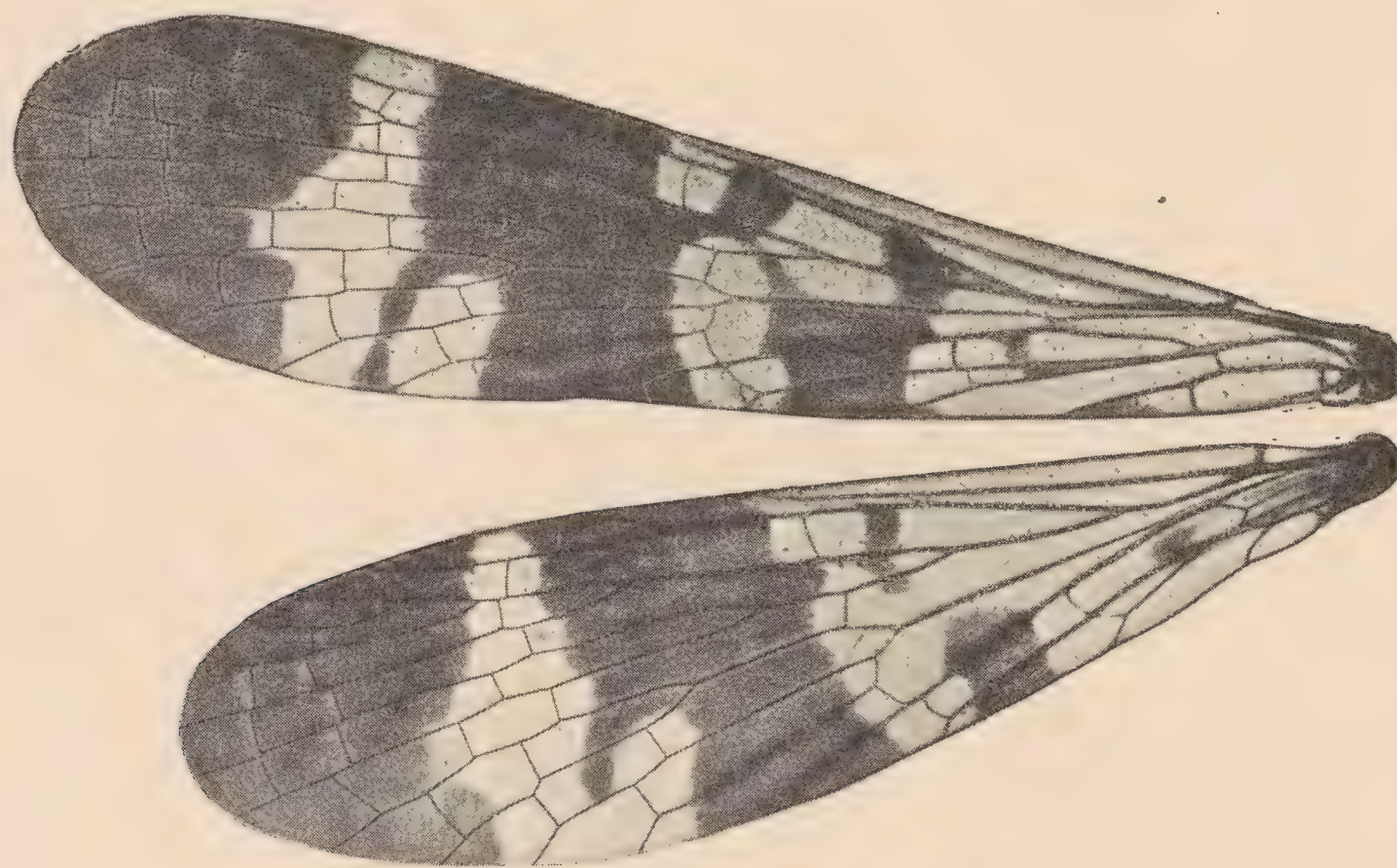


FIG. 46. — *Panorpa japonica* forma *dyscola* ♀
(Coll. Selys).

longitudinally by a pale line between each of the longitudinal veins; in the apical band these pale lines are divided by the darker cross veins.

Forewing : 15-19^{mm}; hindwing : 14-18^{mm}.

Coll. SELYS : 3 ♂, 2 ♀ Japan; 1 ♂, 2 ♀ (105) Japan (PREYER leg.); 3 ♂, 2 ♀ Japan (PREYER leg.); 1 ♀ Gifu, April-Mai 1886 (PREYER leg.). — Mus. Leyden : 3 ♂, 2 ♀ Japan (coll. ROSENBERG). — Mus. Hamburg : 1 ♀ Japan (JOS. SCHEDEL comm.). — Mus. Berlin : 1 ♂, 1 ♀ Yokoama (STAUDINGER). — Mus. Stockholm : 1 ♂ Japan. — Mus. Paris : 1 ♀ Japan (type of *dyscola* NAV.). — Coll. NAVÁS : 1 ♂ Tien-Tsuen, China (type of *P. leucothyria* NAV.).

— Mus. London : 2 ♀ Japan. — Coll. MIYAKÉ : 1 ♀ Higo 1906 (labelled as *pulchra*) — Coll. ESBEN-PETERSEN : 3 ♂, 6 ♀ Japan (MIYAKÉ leg.); 2 ♂, 1 ♀ Japan (MIYAKÉ leg., labelled as *rectifasciata*); 1 ♀ Kumamoto, 17, IV, 1913 (NAKAHARA leg.).

This species is very liable to vary as to the wing markings, and this fact, no doubt, has been the reason why so many species have been described.

In the Selysian collection are 1 ♂, 2 ♀ (105) of the form that is described by MAC LACHLAN as *macrogaster*. In the *Panorpidae* it is not uncommon to see specimens, in which the bands are traversed by a pale line between each of the longitudinal veins.

P. rectifasciata is the less marked form; as a rule only a pterostigmatal and an apical band present. I have a fine series of the form, presented to me by Mr. MIYAKÉ; but as to the anal parts of the male they agree in every respect with the typical form of *japonica*.

P. leucothyria NAV. is most similar to *rectifasciata*; the only difference is the presence of a spot on the hind margin between the two bands (the rest of Abr). The type, a male, before me is immature; its body has been compressed; it is from China (Tien-Tsuen).

P. irregularis MIY. and *P. dyscola* ♀ NAV. (*P. pulchra* MIY. is quite the same form as *dyscola* ♀) belong to more heavily marked forms; in *dyscola* ♀ Smb in the forewing is complete; Bsp large and connected with Smb; Ptb also very broad.

The most marked form is no doubt *P. interrupta* NAV., in which the wings are quite black with exception of the base and a few hyaline spots and cross bands.

In « Stett. Ent. Zeit. », p. 90, 1867, H. A. HAGEN mentions a specimen of *Panorpa* from Japan as follows : « Mit ganz schwarzen, weiss gefleckten Flügeln. » Upon this short description NAVÁS founds his *P. Hageni*. It is not impossible that the specimen that HAGEN alluded to, has been *P. japonica* forma *interrupta*.

***P. nipponensis* Nav. (fig. 47).**

Panorpa nipponensis NAVÁS, Mem. Real Acad. Cienc. Barcelona, p. 418, fig. 25 (1908) (Japan).

Panorpa brachypennis MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, VIII, p. 9, pl. 1, fig. 6 (1908).

Panorpa Klugi MIYAKÉ (nec MAC LACHLAN), Journ. Coll. Agr. Imp. Univ. Tokyo, II, p. 189 (1910). — ID., ibid., p. 117 (1912). — ID., ibid., p. 365, pl. 30, fig. 18; pl. 35 fig. 10 (1913).

Panorpa Klugi subsp. *nigra* MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 137 (1912).

Panorpa Klugi subsp. *nipponensis* MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 366, pl. 30, fig. 20; pl. 35, fig. 13; pl. 37, fig. 11-34 (1913).

Panorpa Klugi subsp. *maculata* MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 367, pl. 35, fig. 11; pl. 37, fig. 29-32 (1913).

Panorpa Klugi subsp. *quadrimaculata* MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 368, pl. 35, fig. 12; pl. 37, fig. 33, 34 (1913).

Aulops dentata NAVÁS, Revue russe d'Entom., XIII, p. 282, fig. 10a, 10b (1913).

Aulops Valignanii NAVÁS, Bull. Mus. d'Hist. nat. Paris, p. 448 (1913).

Aulops picea NAVÁS, Bull. Mus. d'Hist. nat. Paris, p. 449 (1913).

Head and rostrum shining black. Antennae black. Thorax black; meso- and metathorax with narrow testaceous hind borders. Abdomen shining pitchy black. In the male the hind border of third abdominal segment produced in a short and broad lobe. 6th segment cylindrical. 7th segment thinner and a little longer than 6th; 6th and 7th segments at their apices somewhat obliquely truncate above; 8th segment much thinner and longer than 7th, somewhat curved near the base and slightly incrassate towards the apex, which is obliquely truncate above. Upper appendage long and in its apical part gradually narrowed towards the tip. Legs yellowish; the tip of tibiae and of the four tarsal joints brownish; 5th tarsal joint brownish black. Wings long and slender with rounded tip, with strong yellowish tinge and with sooty

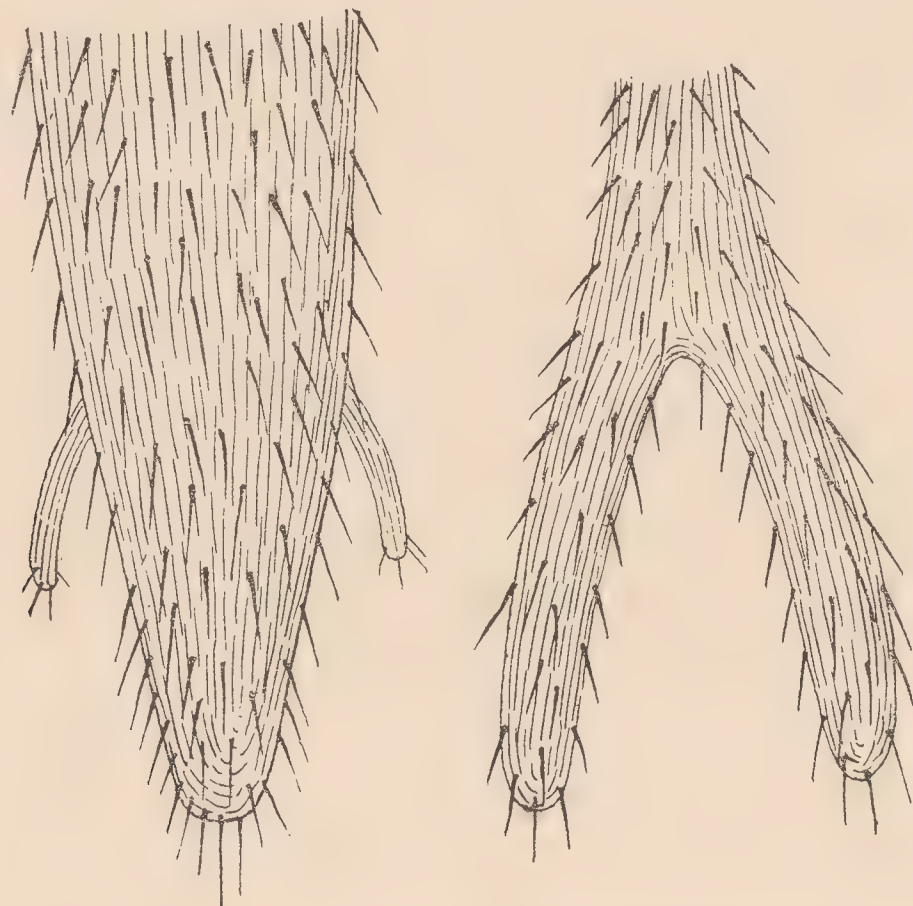


FIG. 47. — *Panorpa nipponensis* ♂
Upper and lower appendage.

black markings. Ptb rather narrow, forked in its hind part; Abr very narrow and generally reaches the margin of the wing. Ab broad and with undulating inner margin. In a few specimens Msp is present as a very small spot; rarely a small spot is found in the forewing near the posterior margin. No other markings in the basal part of the wing.

Forewing : 16-17^{mm}; hindwing : 14-15^{mm}.

Coll. SELYS : 1 ♀ Oiwake, Japan, 1885 (PREYER leg.). — Mus. Hamburg : 4 ♀, Japan. — Coll. ESBEN-PETERSEN : 3 ♂, 6 ♀ Japan (MIYAKÉ leg.). — Mus. Paris : 1 ♂ Yumoto, Japan (type-specimen of *Valignanii*); 1 ♀ Japan (type-specimen of *picea*).

Besides the typical form which is described by MIYAKÉ [Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 137 (1912)] as a subspecies (*nigra*), another form is found, the colour of which is reddish brown with the exception of the black vertex, of a narrow transverse black streak on the dorsum of prothorax, and of a broader transverse streak on the front part of mesothorax. The antennae black except the yellowish basal joint. This form has great likeness to *P. Klugi* MAC LACHLAN as to the colour of the body. It is evident that *P. nipponensis* and *P. Klugi* are closely allied; but the differences in wing markings, in the shape of upper appendage and, as far as I can see, also in the shape of titillators, are so conspicuous that there is good reason to consider each of them good species.

***P. ochraceopennis* Miy. (fig. 48).**

Panorpa ochraceopennis MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 190, pl. XI, fig. 1 (1910). — Id., ibid., p. 372, pl. 31, fig. 18, pl. 35, fig. 15 (1913).

Head, thorax and abdomen shining black; antennae black. Legs yellowish, coxae, tip of

femora, tibiae and 1st-4th tarsal joints blackish; 5th tarsal joint blackish. Hind border of 3rd abdominal segment in the male produced into a short and broad lobe. Sixth segment cylindrical with somewhat obliquely truncate apex above; seventh segment cylindrical, thinner than the sixth and a little longer; its apex obliquely truncate above; eighth a little longer than seventh, gradually incrassate towards the apex, which is obliquely truncate above. Upper appendage narrow and long; its apex incised; branches of lower appendage long, flattened and



FIG. 48. — *Panorpa ochraceopennis* ♂
Lower and upper appendage.

curved. Wings long and narrow, with elliptical apex, strongly yellowish tinge and sooty brown markings. Ptb broad, not forked in its hind part but prolonged basally along the hind margin, usually only in the forewing; Msp oblique, connected with Ptb; no spots in the basal part of the wing.

Forewing : 17^{mm}; hindwing : 15^{mm}.

Coll. SELYS : 1 ♂ Japan. — Mus. Hamburg : 1 ♂, 2 ♀ Japan. — Coll. ESBEN-PETERSEN : 2 ♂, 1 ♀ Mt. Konsei, Nikko, 25. VII, 1910 (MIYAKÉ leg.).

P. Klugi Mac Lachlan (fig. 49, 50) (plate I, fig. 8).

Panorpa Klugi MAC LACHLAN, Journ. Linn. Soc. London, IX, p. 256 (1868). — ID., Trans. Ent. Soc. London, p. 185 (1875).

Panorpa japonica KLUG (nec THUNB.), Abh. Königl. Akad. Wiss., p. 106 (1836).

Panorpa ochracea MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 3, pl. 1, fig. 9 (1908). — Journ. Coll. Agr. Imp. Univ. Tokyo, p. 370, pl. 30, fig. 19; pl. 35, fig. 11 (1913).

Panorpa Drouarti NAVÁS, Mem. Real Acad. Cienc. Barcelona, p. 419, fig. 26a, 26b (1908).

Panorpa dyscola ♂ NAVÁS, Ibid., p. 420, fig. 27a (1908).

Panorpa Klugi (nec MAC LACHLAN) subsp. *Drouarti* MIYAKÉ, loc. cit., p. 367 (1913).

Aulops trisignata NAVÁS, Bull. Mus. Hist. natur., Paris, p. 450 (1913).

Head black; rostrum and maxillary palpi reddish brown; tip of apical joint black. Antennae blackish; the two basal joints reddish brown. Prothorax and front half of mesothorax

blackish above; the rest of thorax and abdomen reddish brown. Legs testaceous or reddish brown; tip of tarsal joints darker. In the male the hind border of third segment is produced above into a short broad lobe; a tubercle on the dorsum of the fourth, concealed by the prolongation of the third segment. Sixth and seventh segments stout, cylindrical; the seventh

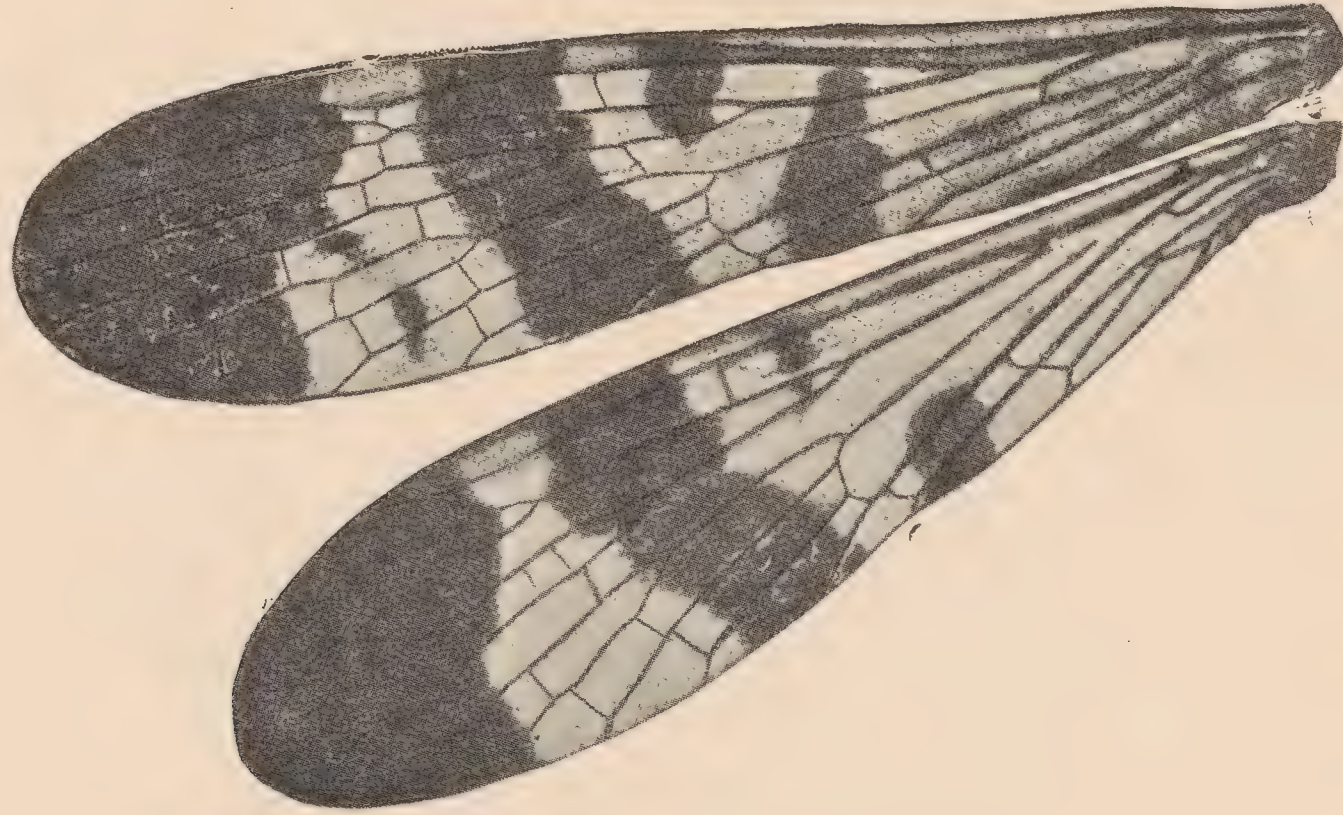


FIG. 49. — *Panorpa Klugi* ♂
Type-specimen of *P. Drouarti* Nav.
(Museum Paris).

slightly thinner than the sixth; eighth longer than the seventh, cylindrical, gradually incrassate to the obliquely truncate apex. Branches of lower appendage slender and linear; upper appendage of the same with and with rounded apex. Wings rather narrow, with rounded apex

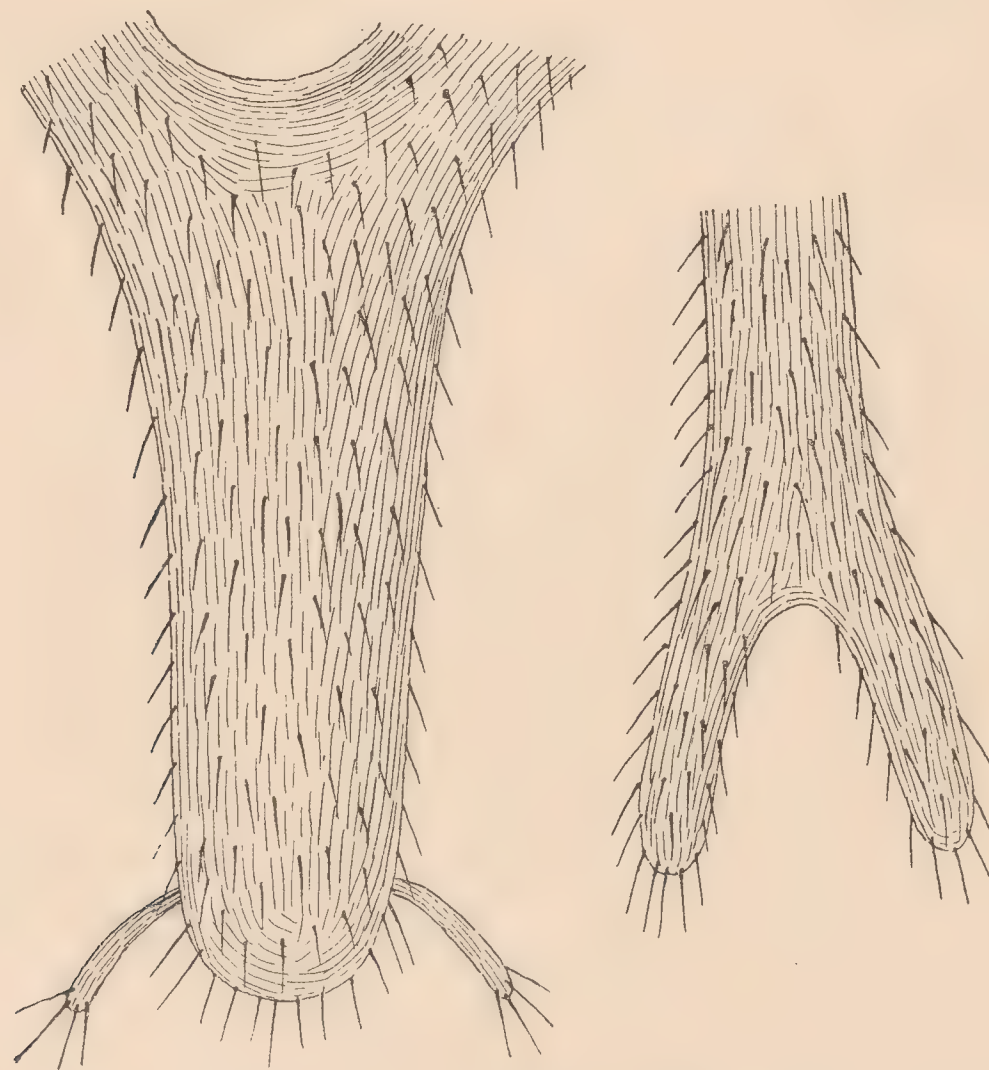


FIG. 50 — *Panorpa Klugi* ♂
Upper and lower appendage.

and with a yellowish tinge. Veins yellowish brown, cross veins paler; markings sooty black. Ab broad; Ptb narrow, just as broad at the front margin as at the hind margin; between the two bands often a small spot at the hind margin (the rest of Abt); Msp frequently present; of Smb only a large spot on the hind margin.

Forewing : 13-15,5^{mm}; hindwing : 11-14^{mm}.

Coll. SELYS : 2 ♂, 2 ♀ (106); 4 ♂, 10 ♀ Japan (PREYER leg.); 1 ♂ Japan (LEWIS leg.). — Mus. Paris : 1 ♂ Kofou, Japan (type-specimen of *Drouarti*); 1 ♀ Mont Takao, Japan (type-specimen of *trisignata*). — Coll. ESBEN-PETERSEN : 1 ♂ Japan (ex coll. MIYAKÉ).

This species is closely allied to *P. japonica*, but the stronger yellowish tinge of the wings, the paler nervures, the paler colour of the body and the narrower Ptb are of good value in distinguishing the two species.

[*P. obscura* Miy.].

Panorpa obscura MIYAKÉ, Journ. Coll. Agric. Imp. Univ. Tokyo, p. 195, pl. XI, fig. 2, 2a, 2b (1910) (Japan). — Id., ibid., p. 371, pl. 31, fig. 17; pl. 36, fig. 22 (1913).

« Body blackish piceous; rostrum blackish piceous, with the palpi testaceous; antennae and eyes testaceous; legs yellowish.

Wings moderate, slightly tinged with ochraceous yellow; with the apex elliptical; a broad (but narrower compared with that of *P. japonica* THUNB. or *P. rectifasciata* MIYAKÉ) fuscous fascia beyond the middle with slightly wavy inner and outer edges; apex also fuscous, with the inner edge slightly sinuous beyond middle; no points or patches otherwise present; longitudinal and transverse veins fuscous, of which the latter is somewhat lighter in colour.

Abdomen blackish or blackish testaceous; in the ♂ the posterior margin of 3rd dorsal segment of the abdomen is produced into a short broad median lobe; 6th segment stout, cylindrical, 7th slightly narrow and longer than the 6th; 8th slightly longer and much narrower than 7th; 9th rather slender, the chelae ochraceous, slender, the appendages rather long, divaricate towards its extremity, so as to show V-shaped structure.

Expanse : 27-32^{mm} ».

Coll. SELYS : not present.

I do not know this species.

P. trizonata Miy. (fig. 51).

Panorpa trizonata MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 7, pl. 1, fig. 11 (1908). — Id., Journ. Coll. Agr. Imp. Univ. Tokyo, p. 368, pl. 34, fig. 12a, 12b; pl. 35, fig. 17, 18 (1913).

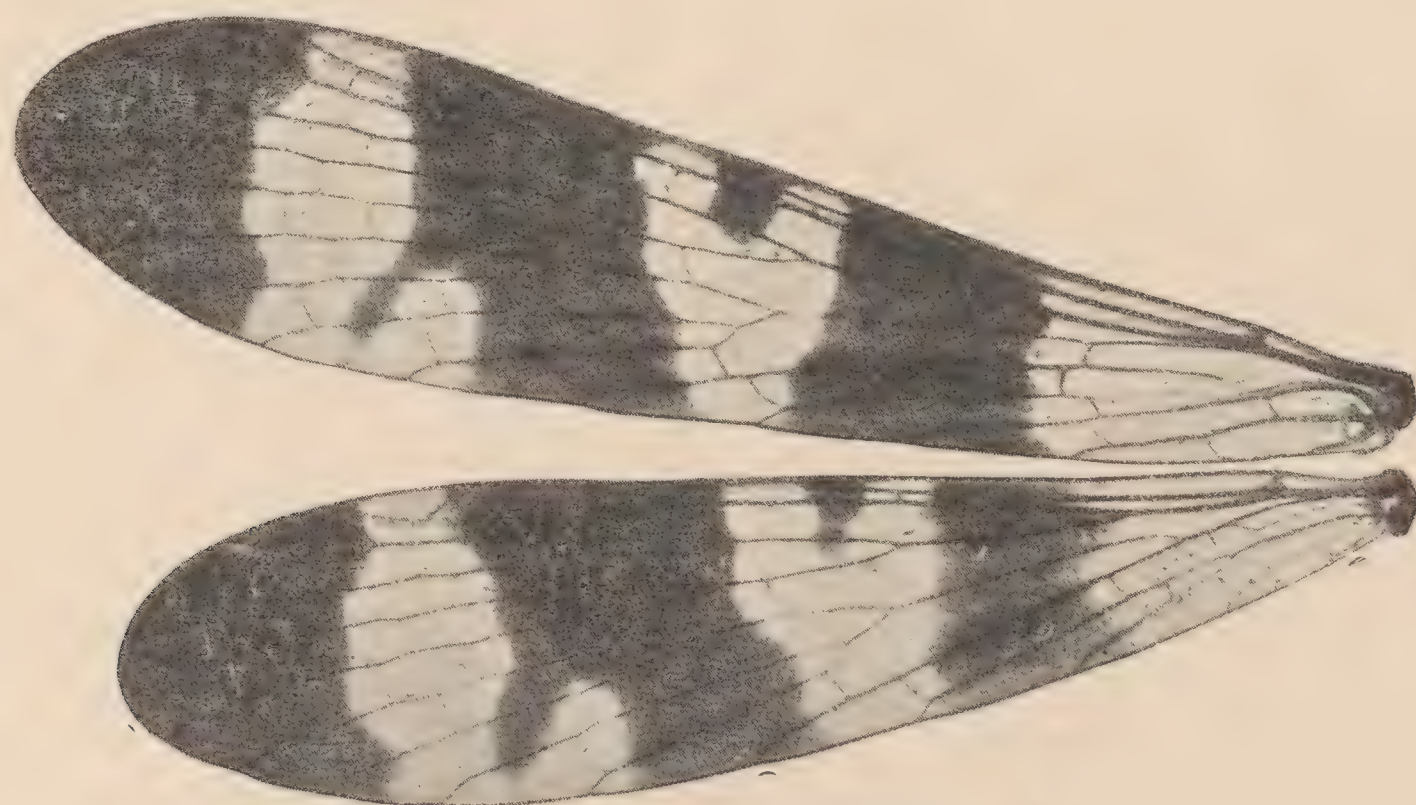


FIG. 51. — *Panorpa trizonata* ♂
(Coll. Esben-Petersen).

Head, thorax and abdomen shining black. Antennae black. Legs yellowish; the coxae and the tip of tarsal joints blackish. In the male the hind border of third abdominal segment is produced into a short broad lobe. Sixth segment cylindrical, slightly narrowed towards the apex; seventh a little longer, curved upwards near the base, gradually incrassate towards the

apex. The posterior margin of sixth and seventh segments slightly produced; eighth segment as long as seventh, gradually incrassate towards the apex, which is obliquely truncate. Upper appendage deeply incised at the apex; branches of lower appendage flattened, their tips far apart. Wings yellowish white, long and narrow with elliptical apex and with sooty black markings. Smb very broad and with straight margins; Msp present; Ptb almost as broad as the front part; Abr very narrow, hardly reaching the hind margin; Ab broad, without pale spots.

Forewing : 15^{mm}; hindwing : 14^{mm}.

Coll. SELYS : 1 ♀ (100), Japan (PREYER leg.). — Mus. Stockholm : 1 ♂ Shinano (BAGGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Japan (MIYAKÉ leg.).

It is a fine looking species, and the only known Japanese species which has complete Smb.

[**P. Lewisi** Mac Lachl.] (fig. 52).

Panorpa Lewisi MAC LACHLAN, Bull. Soc. Ent. Suisse, p. 402 (1887). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, 198 (1910). — ID., ibid., p. 374, pl. 30, fig. 15; pl. 35, fig. 16 (1913).

Panorpa chuzenjiensis MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 201, textfig. (1910).

Head, rostrum, thorax and abdomen shining black. Maxillary palpi brown; the apical joint blackish at the tip. Antennae black. Legs yellowish brown; coxae and the extreme base of femora black. The tip of

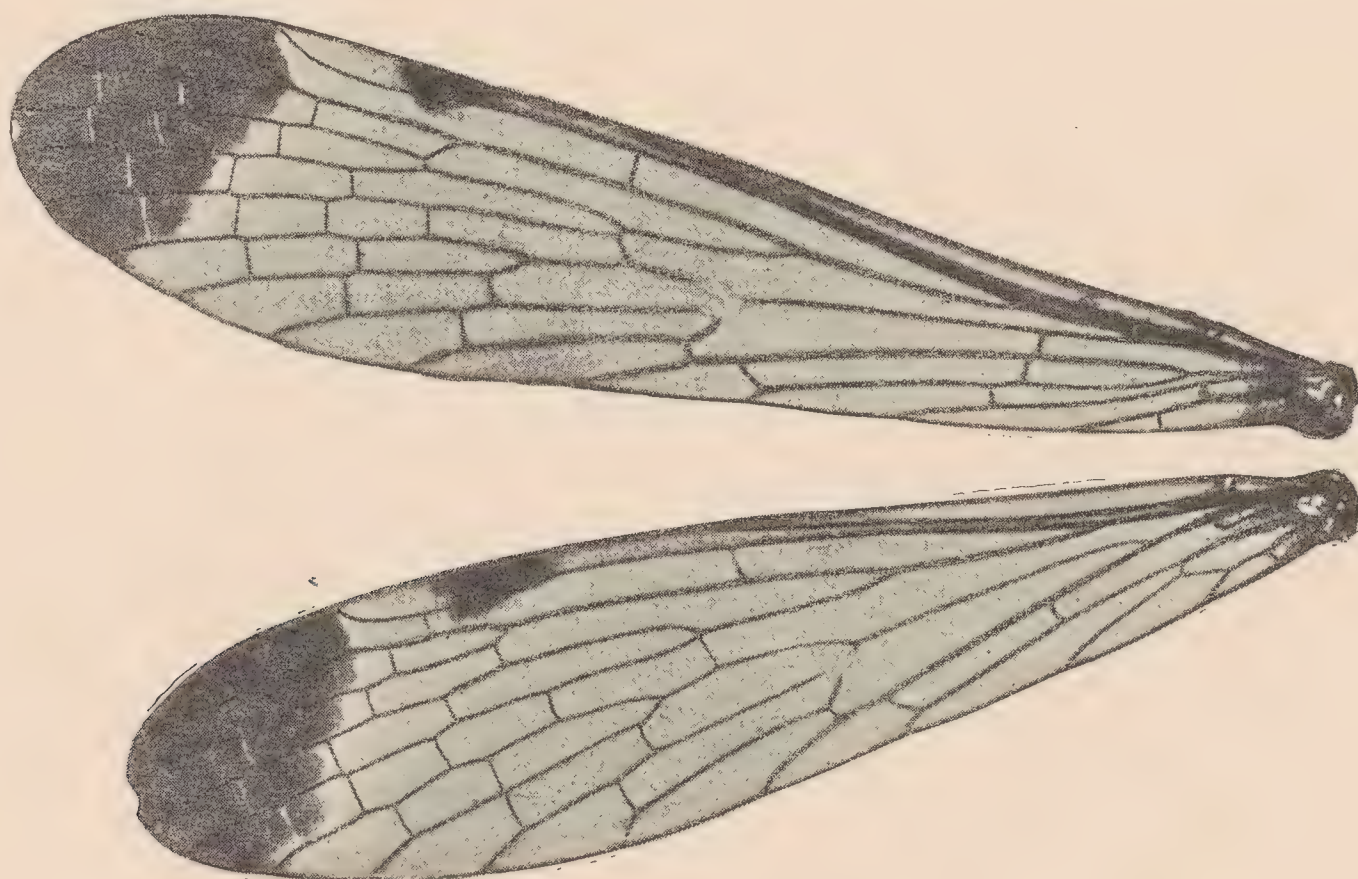


FIG. 52. — *Panorpa Lewisi* ♀
(Coll. Esben-Petersen).

first to fourth tarsal joint and the fifth joint totally black. Claws serrate. Wings long and narrow, with strong yellowish tinge, with blackish brown apex and with a blackish brown spot at the inner end of pterostigma, the outer part of which is strongly yellowish coloured. The veins blackish brown.

Forewing : 19^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♀ Mt. Konsei, Nikko, 25. VII. 1912 (MIYAKÉ leg.).

It is a fine looking species. I have not seen the male, and I, therefore, below quote the description given by MAC LACHLAN :

« Au troisième segment dorsal le bord postérieur porte une dilatation courte mais large dont la marge est tronquée et hérissée. (Pas de dent visible sur le dos du quatrième.) Sixième aussi long que les troisième,

quatrième et cinquième réunis; cylindrique un peu recourbé. Septième presque aussi long que le sixième et de la même forme, mais un peu plus grêle et plus recourbé : le bout tronqué et oblique. Huitième, encore plus long que le septième, en forme de cône allongé et recourbé; tronqué au bout. Base du segment chélifère petite; les branches des appendices en lames allongées et aplaties, écartées, mais convergeant l'une vers l'autre, hérissées au bout, ne s'étendant que jusqu'à la base de la pince. Pincés très longues, grêles, et se croisant au bout qui est rougeâtre. tout près de la base de chacune d'elles il y a une forte corne assez aplatie, droite obtuse au bout, placée un peu obliquement, et presque sans poils. »

[*P. sachalinensis* Mats.]

Panorpa sachalinensis MATSUMURA, Journ. Coll. Agr. Tohoku Imp. Univ. Sapporo, IV, p. 12 pl. 1, fig. 9 and 10 (1911). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 352 (1913).

MATSUMURA, *loc. cit.* :

« Pechschwarz. Rostrum an den Seiten und unten sowie auch Palpen bräunlich. Antennen schwarz, kurz dicht behaart. Pronotum in der Mitte mit 2 Querfurchen, wie das Mesonotum impunktiert, Scutellum hinten und Postscutellum bräunlich. Flügel hyalin, schwärzlich gefleckt, beim ♂ ein wenig gelblich betrübt, Nerven dunkelbraun, Quernerven weisslichgelb, an der Spitze breit schwarz, am Zweidrittel des Flügels eine schiefergerichtete, in der Mitte eingeschnürte Querbinde, bei der Aussenseite dieser Binde am Hinterrande mit einem schwarzen Längsstriche, nahe in der Mitte mit einem den Vorrand nicht ganz erreichenden Quersfleck oder mit 2 Fleckchen, noch ein anderes Fleckchen nahe am Costalrande zwischen diesem und der schiefen Querbinde; Hinterflügel gerade wie der Vorderflügel gefleckt, nur der Mittelfleck am Hinterrande in ein kleines Fleckchen reduziert und ein am Vorderrande liegendes Fleckchen fehlend; bei einem ♂ fehlen mittleren und innersten Quersflecken. Beine blassgelblich, Coxen, Trochanter, Tarsalsegmente an jeder Spitze und Klauenglieder dunkel; Klauen gelblich. Abdomen beim ♂ lang, am Hinterrande des 2ten Segmentes mit einer hakenförmig gekrümmten, an der Spitze abgerundeten Vorrangung, welche mit einer zugespitzten konischen Vorrangung des 3ten Segmentes zusammen stossend; Zange lang, an der Spitze gelblichbraun, nahe der Basis innen mit einer Vorrangung, am letzten Segmente, unten mit noch einem flachen zangenartigen Anhang, welcher die Gabelbasis der echten Zange bedeckend. »

Länge : ♀ 13, ♂ 20^{mm}. — Flügel : ♂ ♀ 15-17^{mm}.

« Der Zeichnung und Form nach *P. macrogaster* M' L. etwas ähnlich. »

« Fundorte : Korsakoff, Mauka, Chipsani, Tonnaitcha, Galkinowraskoe und Todoroki, gesammelt in zahlreichen Exemplaren von Herren M. OGUMA und B. MIYAKÉ. »

Coll. SELYS : not present.

I do not know this species, but I think it is closely allied to and probably identical with *P. orientalis* MAC LACHL.

[*P. orientalis* Mac Lachl.] (fig. 53, 54, 55).

Panorpa orientalis MAC LACHLAN, Bull. Soc. Ent. Suisse, p. 400 (1887).

Aulops melania NAVÁS, Revue russe d'Entom., XII, p. 421, fig. 5a, 5b, 5c (1912).

Head black; rostrum brownish black, shining; maxillary palpi dark brown. Antennae blackish at the base, becoming dark brownish towards the apex. Thorax black above, brownish black on the sides; meso- and metathorax with narrow reddish brown hind margin. In the male the fore legs are yellowish, the intermediate and hind legs yellowish brown; tip of apical joints brown. Claws serrate. Abdomen above and below shining black, stout. In the female thorax quite black above and below. Abdomen blackish; legs more pitchy brown than in ♂. In the male the hind border of 3rd abdominal segment is produced in the middle above into a flap, which is curved downwards at its tip, that rests upon a sharply pointed tubercle in the middle of fourth segment. Branches of lower appendage very broadly stalked, flattened, curved inwards; upper appendage long; its apex deeply and narrowly incised. Titillators not visible, but the penis long with its tip in level with the lower appendage. The inner angle of the basal joint of the chelae strongly yellowish white. Wings with rounded tips, hyaline with a faint yellowish tinge. Venation blackish brown; cross veins in the apical part very pale, hardly visible. Markings dark sooty brown. A small spot (Bsp) near base of forewing; another

that is larger, is touching the hind margin (both wanting in the hindwing); Smb broad (in hindwing indicated by two spots); Msp large, bent inwards at its apex; Ptb broad and forked in its lower half; Abr narrow, sometimes present as a spot at the hind margin; Ab broad.

Forewing : 15,5-18^{mm}; hindwing : 14-17^{mm}.

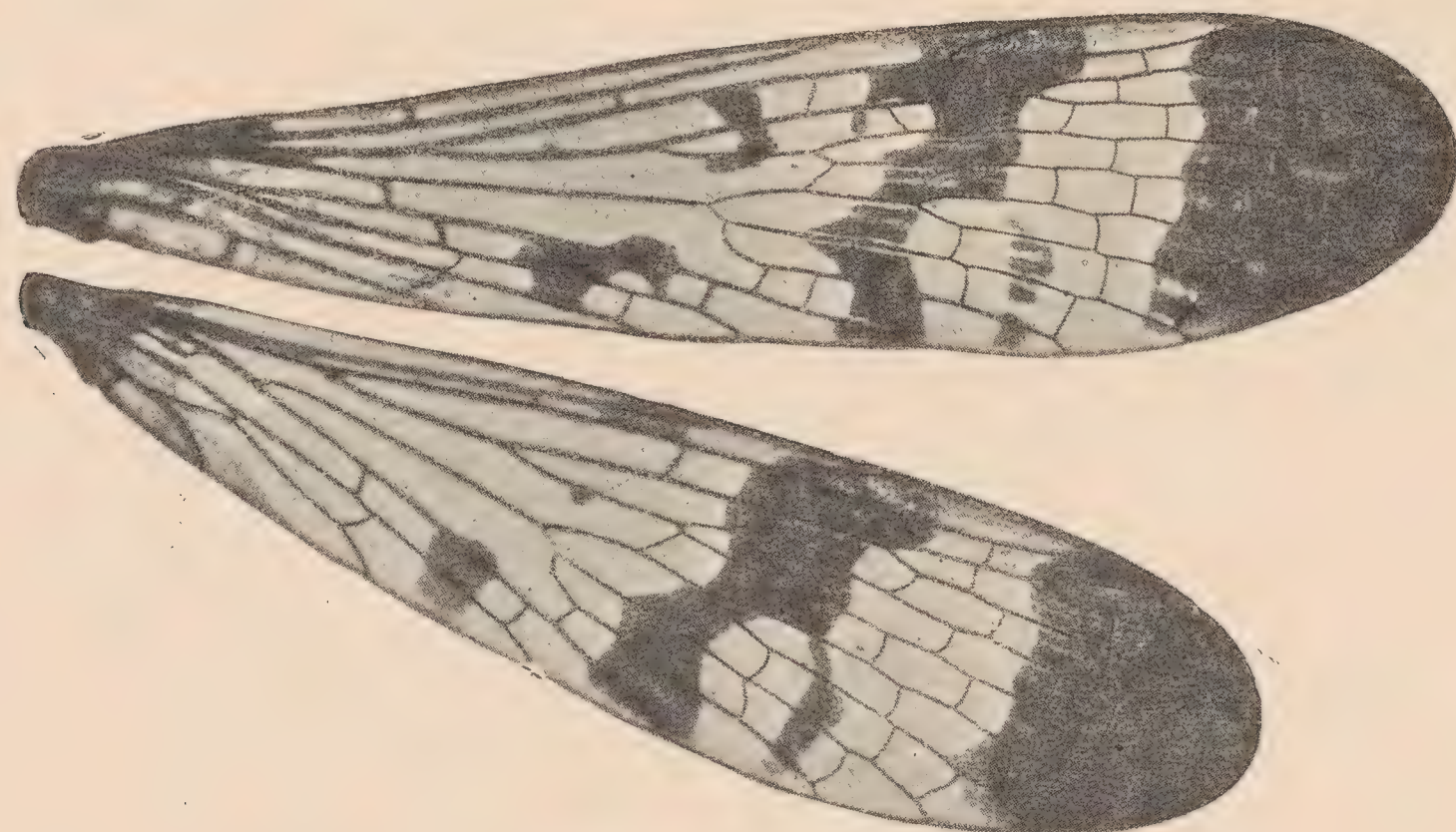


FIG. 53. — *Panorpa orientalis* ♂ type-specimen (Museum Zürich).

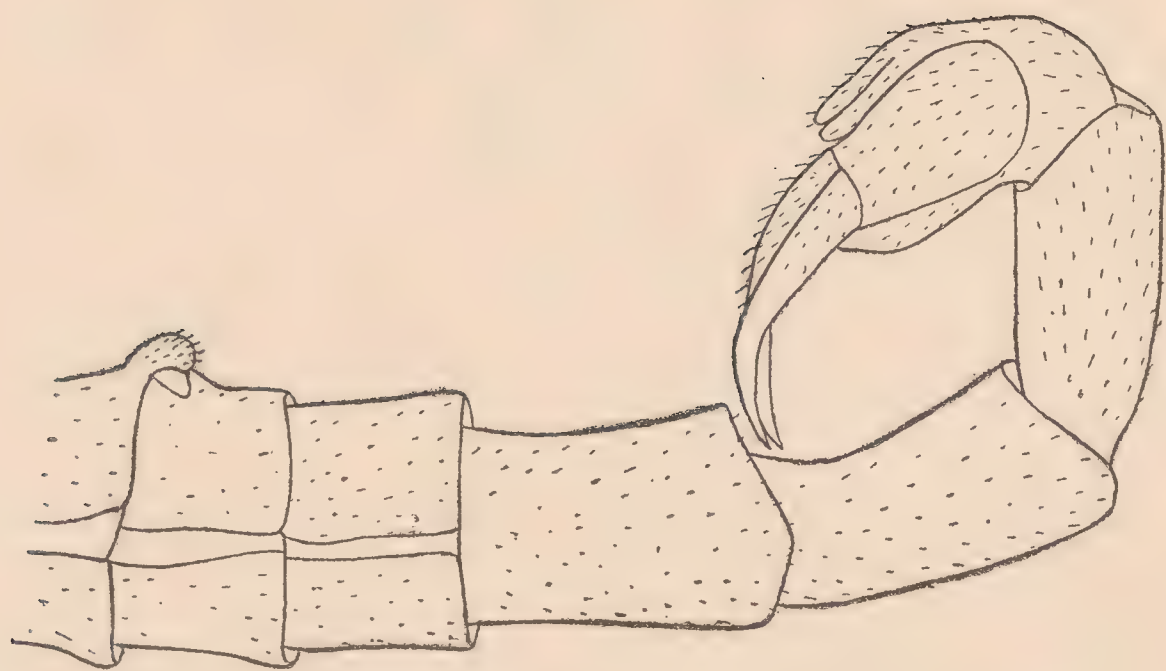


FIG. 54. — *Panorpa orientalis* ♂ type-specimen
Lateral view of abdominal segments
(Museum Zürich).

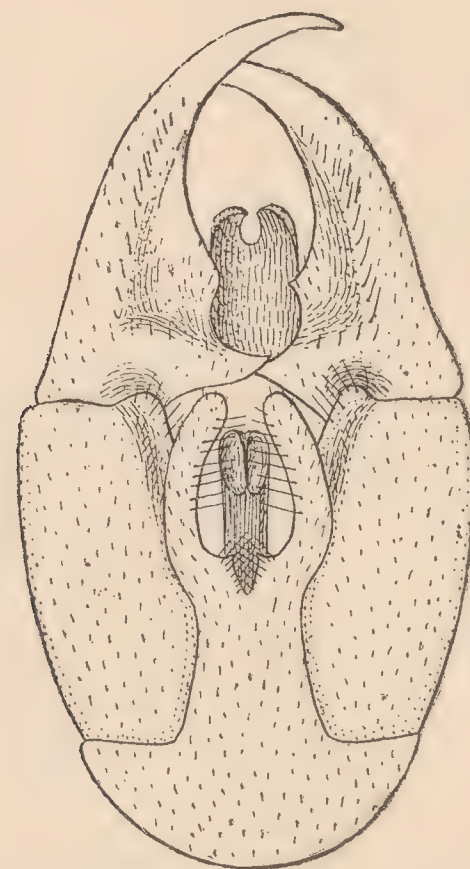


FIG. 55. — *Panorpa orientalis* ♂ type-specimen
Dorsal view of terminal segment
(Museum Zürich).

Coll. SELYS : not present. — Mus. Zürich : 1 ♂ Wladiwostok (MAC LACHLAN's type). — Mus. Leyden : 2 ♂ Jankowsky, South Ussuri. — Mus. Hamburg : 2 ♂, 4 ♀ Amur (DÖRRIES leg.).

The wing markings vary to some degree. The type-specimen of MAC LACHLAN is not strongly marked; it wants the two basal spots, the submedian band; the basal branch of the pterostigmatal band narrow.

[*P. approximata* Esb.-Peters.] (fig. 56, 57).

Panorpa approximata ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 223 (1915).

Head and rostrum jet black; maxillary palpi pale brown, the apical joint with black tip. Antennae black, becoming brownish black towards the apex. Prothorax black; meso- and metathorax blackish with the hind half reddish brown. Abdomen black with the hind and side margins of the basal segments somewhat dark reddish brown. Hind margin of 3rd abdominal segment in the male produced into a somewhat raised, club shaped prolongation, the tip of which rests upon a pointed elevation on the 4th segment. 6th segment

cylindrical; the upper edge, seen from side, a little incurved; 7th somewhat broadened towards the apex, the upper edge incurved; 8th also broadened towards the apex; the upper edge straight; the sides of the three segments somewhat produced at the apex. Branches of lower appendage very robust, placed on edge in their apical part; upper appendage very long, its apical part turned up between the chelae. The branches of the chelae very long, slender, curved outwards in the middle, downwards in the apical half, the tips approximating. Legs and sides of thorax yellowish brown. Apical joint of tarsi and the tip of the others brownish black.

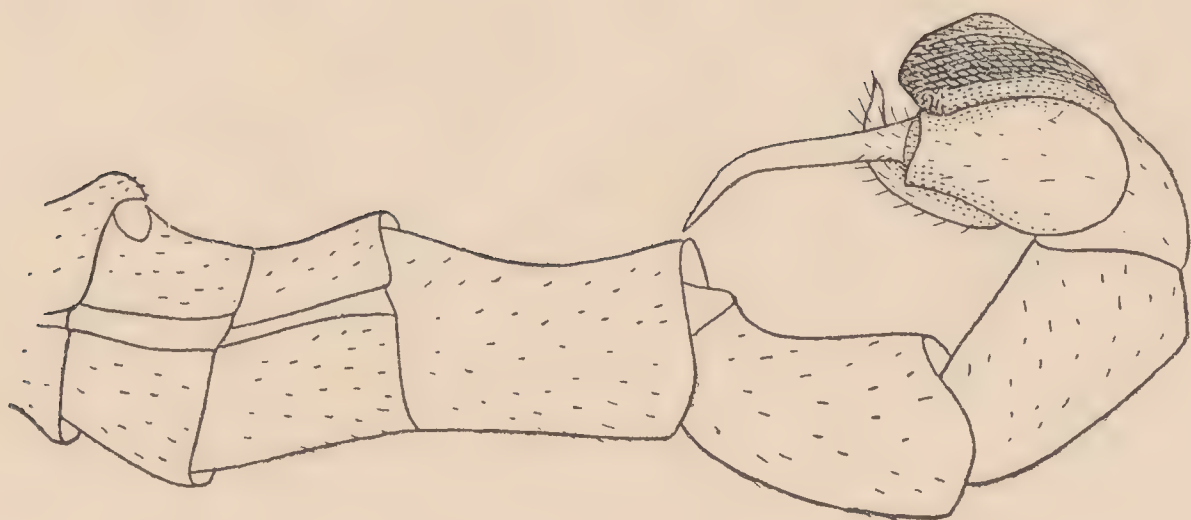


FIG. 56. — *Panorpa approximata* ♂ type-specimen
Lateral view of abdominal segments
(Museum London).

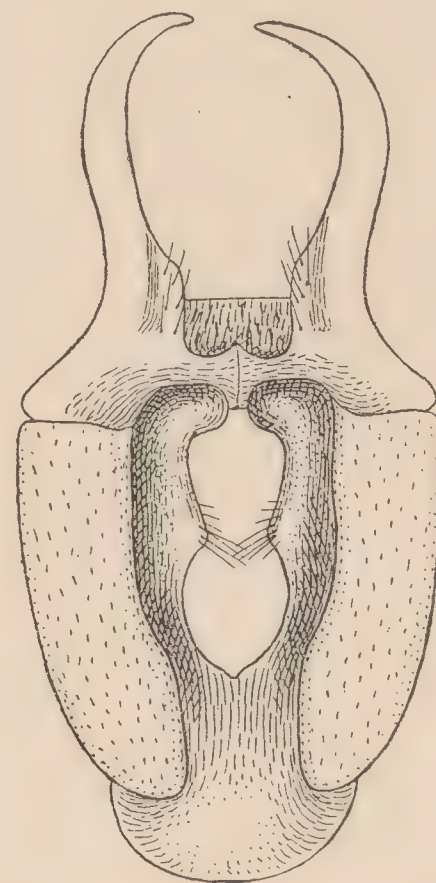


FIG. 57. — *Panorpa approximata* ♂ type-specimen
Dorsal view of terminal segment
(Museum London).

Claws serrate. Wings hyaline with yellowish tinge and with elliptical apex. Longitudinal veins dark brown, in the markings blackish; apical cross veins yellowish white in the hyaline areas and yellowish brown in the markings. The markings sooty brown, as in *P. orientalis*.

Forewing : 16-17^{mm}; hindwing : 15-16^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♂, 4 ♀ Korea, S. Fchikawa, 1905. — Coll. ESBEN-PETERSEN : 1 ♀ from the same locality.

At first sight the species looks like *P. orientalis*, but the peculiar shape of 9th segment in the male easily separates the two species.

[*P. amurensis* Mac Lachl.] (fig. 58).

Panorpa amurensis MAC LACHLAN, Ann. Soc. Ent. Belg., XV, p. 59, pl. I, fig. 11, 11a, 11b (1872).

Head black; rostrum reddish brown to dark brown. Antennae blackish, becoming dark brown towards the apex. 1st, 2nd and the base of 3rd joint reddish brown. Prothorax reddish brown above with a blackish, transversal streak; meso- and metathorax reddish brown; the former in front with a short blackish streak at the side margin; abdomen and the sides of thorax reddish brown; in the male a narrow black streak along the hind border of 6th, 7th and 8th segments. Hind border of 3rd segment produced into a flap above, the tip of which is rounded and bent downwards, resting on a strongly pointed tubercle on the front half of 9th segment; 6th segment short, one and a half times as long as the 5th; 7th and 8th of the same length, stout; each of them one and a half times longer than 6th, cylindrical and a little broadened towards the apex. Branches of lower appendage with long stalk, flattened. Apex of penis visible, cleft. Titillators not visible. Upper appendage narrow, very long, extending to the middle of the branches of chelae, the apex deeply cleft. Legs reddish yellow; the tip of tarsal joints darker. Claws serrate. Wings narrow, gradually broadened towards the apex, which is almost semi-circular. Membrane with a strong reddish yellow tinge, especially towards the base. Venation brown. Cross veins in the apical half hardly visible, whitish yellow. Marking dark reddish brown. Two or three basal spots in the forewing of ♂ (two in the middle, one at the hind

margin). Smb divided into two spots (only the posterior one in the hindwing) which are smallest in the ♀. Msp elongate, curved inwards at its posterior apex. Ptb narrowed in the middle, forked in its lower half; only

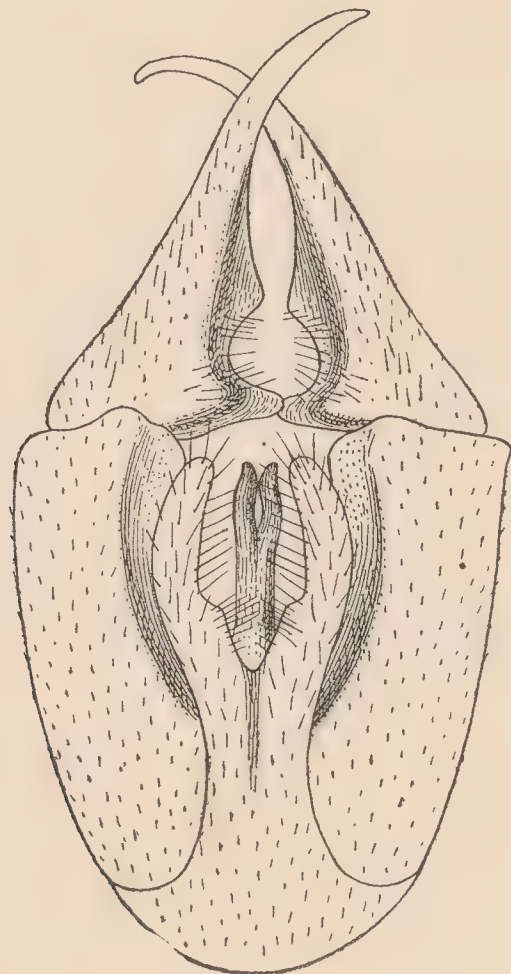


FIG. 58. — *Panorpa amurensis* ♂
Dorsal view of terminal segment
(Museum Leyden).

an elongate spot at the hind margin is present of Abr. Ab broad, with irregular inner margin and with yellowish white cross veins.

Forewing : 12-13^{mm}; hindwing : 11-12^{mm}.

Coll. SELYS : not present. — Mus. Leyden : 1 ♂, 2 ♀ Jankowsky, South Ussuri.

[**P. Takenouchii** Miy.] (fig. 59, 60).

Panorpa Takenouchii MIYAKÉ, Bull. Coll. Agr. Imp. Univ. Tokyo, p. 10, pl. I, fig. 5 (1908).

— ID., Journ. Coll. Agr. Imp. Univ. Tokyo, p. 362, pl. 29, fig. 15; pl. 36, fig. 7, 10 (1913).

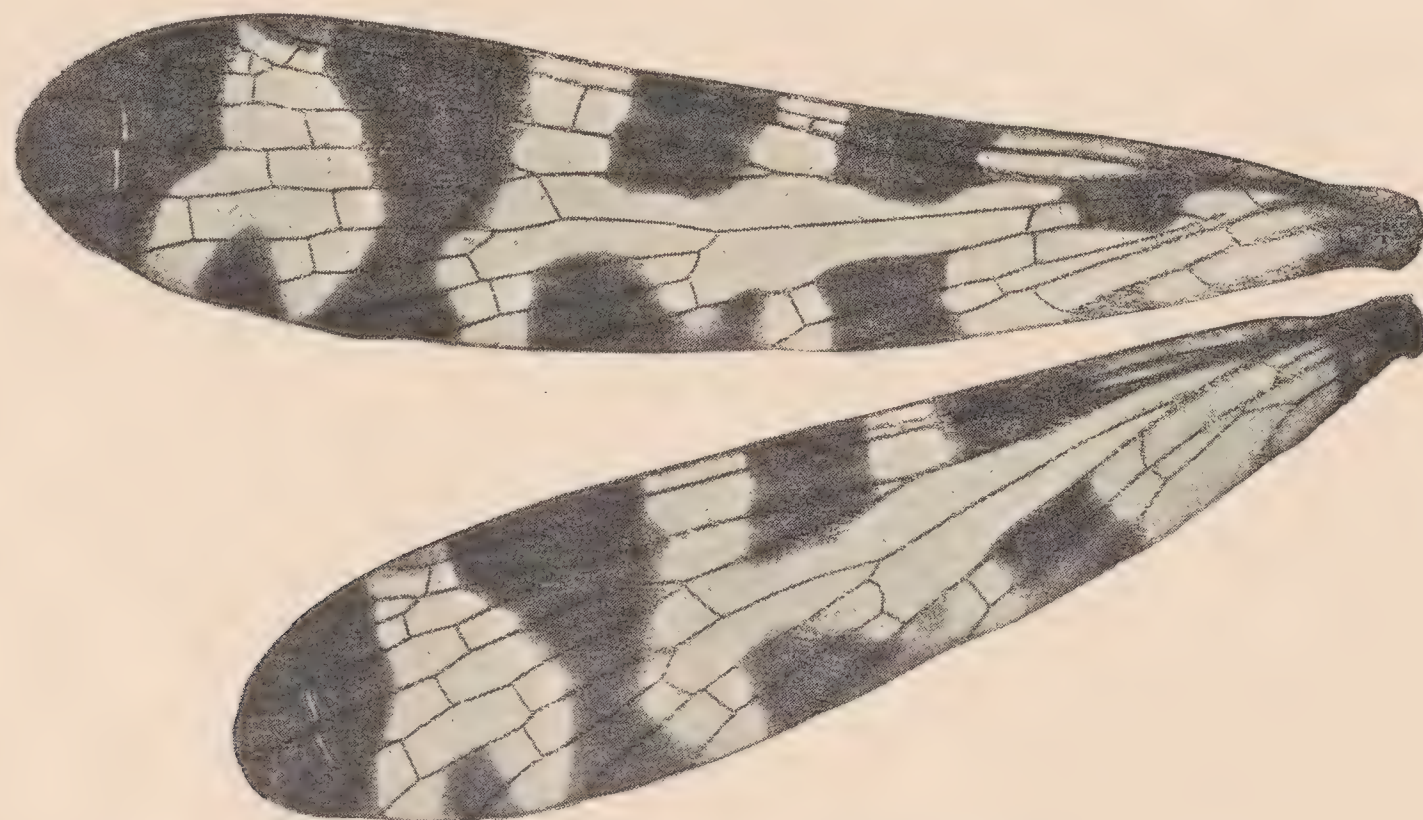


FIG. 59. — *Panorpa Takenouchii* ♀
(Coll. Esben-Petersen).

Face and rostrum ochraceous; vertex shining black. Antennae pitchy black; the basal joint stout, yellowish brown; the second joint yellowish brown at the base. Prothorax pitchy brown with yellowish brown front and hind margin; meso- and metathorax dorsally pitchy brown with a broad yellowish brown median streak. The sides and venter of thorax yellowish. Abdomen in ♀ pitchy black; the three terminal

segments brown. In the ♂ the abdomen is greyish brown at the base, becoming yellowish towards the apex. Third segment much prolonged at its apex above. The stalk of lower appendage broad; the two branches wide apart, narrow, flattened. The cavity in which the penis and titillators are placed, is open. The titillators

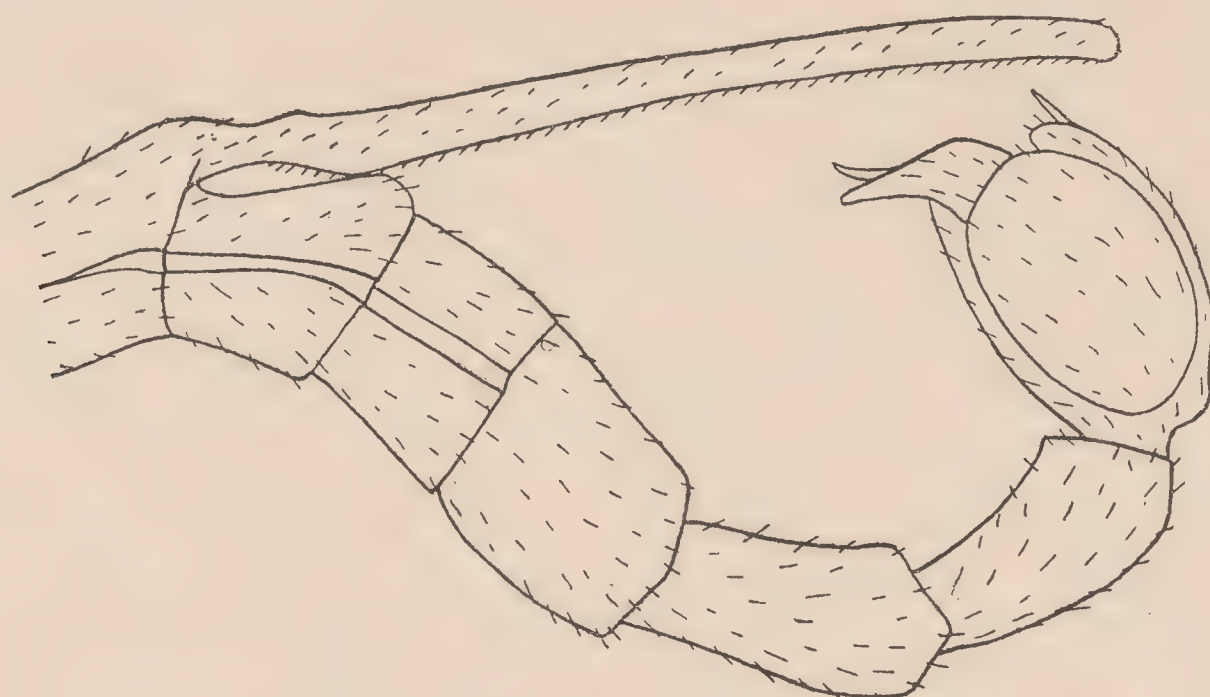


FIG. 60. — *Panorpa Takenouchii* ♂
Lateral view of abdominal segments
(Coll. Miyaké).

are cleft; the outer branch geniculate; the tip of chelae blackish brown. Legs yellowish; tip of tibiae and tarsal joints with a narrow brown band; claws serrate. Wings elongate, lacteous with very pale veins and with sooty brown markings.

Forewing : 15,5^{mm}; hindwing : 14^{mm}.

Coll. SELYS : not present. — Coll. MIYAKÉ : 1 ♂ Kiushue, V, 1910. — Coll. ESBEN-PETERSEN : 1 ♀ Japan (ex coll. MIYAKÉ).

[*P. cornigera* Mac Lachl.] (fig. 61, 62, 63, 64).

Panorpa cornigera MAC LACHLAN, Bull. Soc. Ent. Suisse, p. 404 (1887). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 189 (1910). — Id., ibid., IV, p. 338, pl. 30, fig. 13a; pl. 36, fig. 5 and 6 (1913).

Panorpa Galloisi NAVÁS (nec MIYAKÉ), Bull. Mus. d'Hist. nat. Paris, p. 445 (1913).

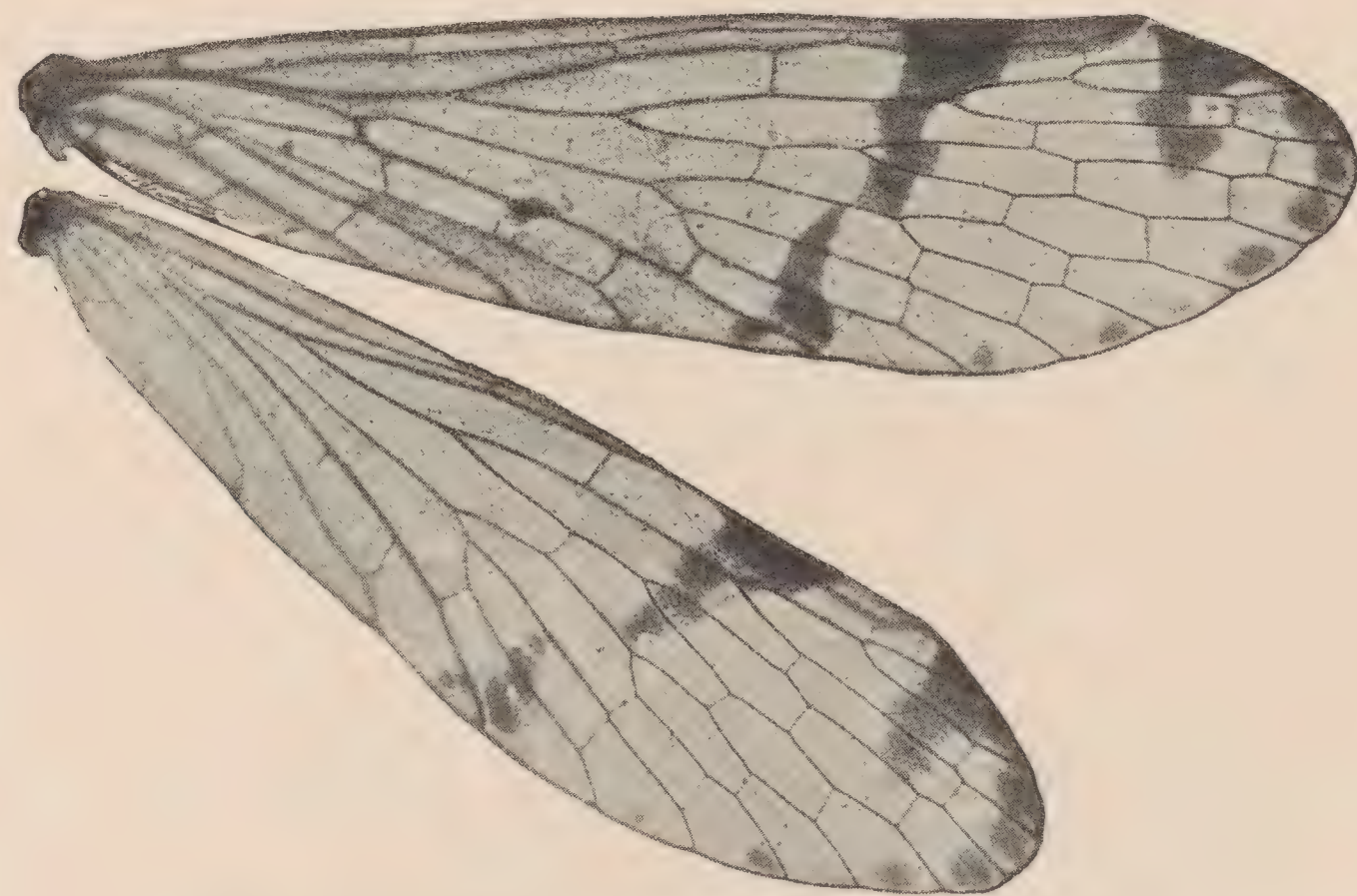


FIG. 61. — *Panorpa cornigera* ♂ type-specimen
(Museum Zürich).

Head black, sometimes two small brown spots on the hind margin are present; rostrum yellowish brown to blackish brown; maxillary palpi brown, the apical joint darker. Antennae black. Thorax and

abdomen black; the three terminal segments sometimes paler in the male. Legs yellowish or reddish yellow, tip of tarsal joints brownish black, the apical one almost brownish black. Claws serrate. In the male the hind border of third abdominal segment above a little produced. The hind border of 6th segment produced above

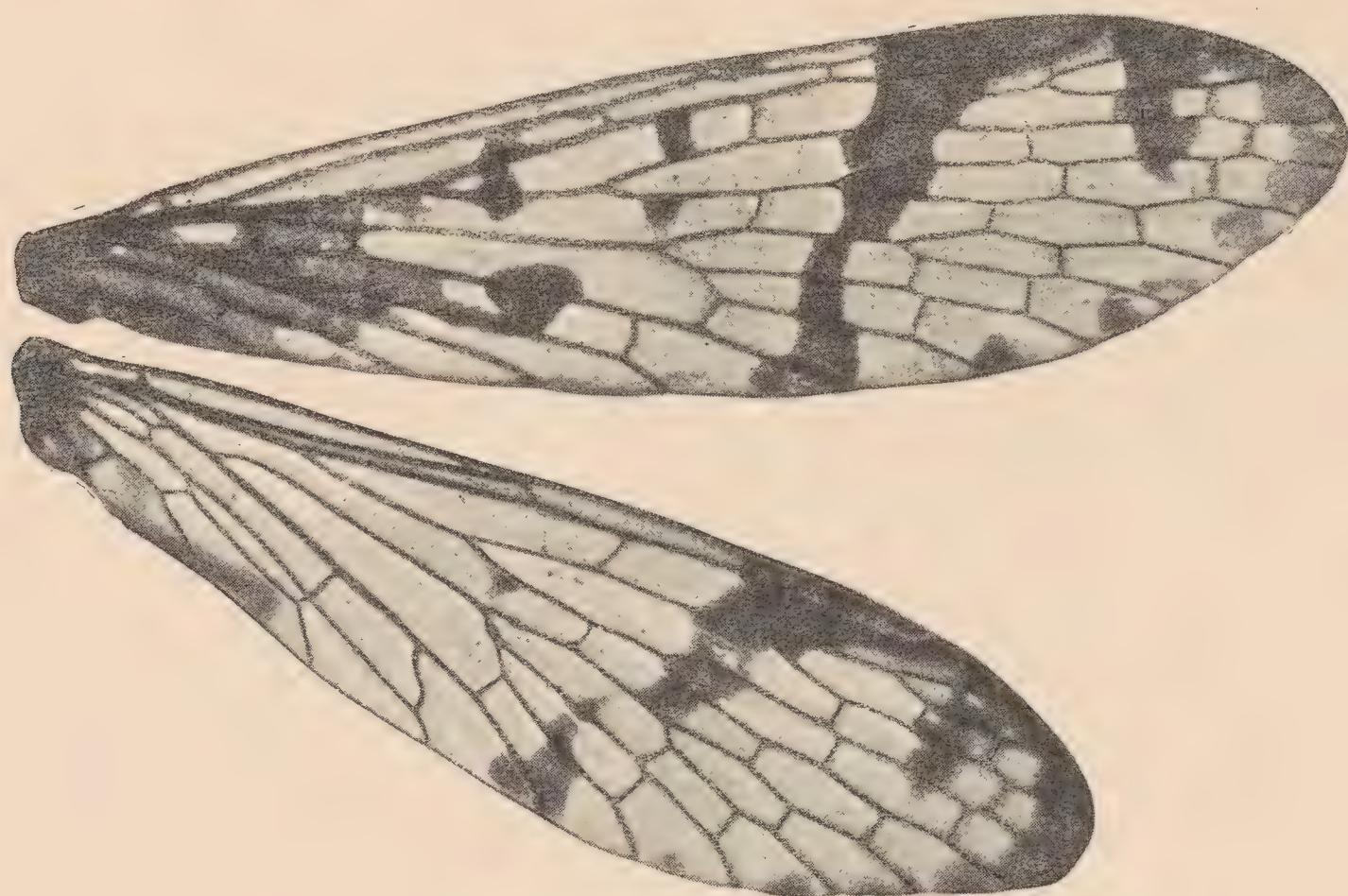


FIG. 62. — *Panorpa cornigera* ♀ type-specimen
(Museum Zürich).

into a slender, brown, somewhat raised horn, with obtuse tip; 7th and 8th slender, broadened towards the apex, and a little curved at the base. Branches of lower appendage long, flattened, straight and with rounded tips. Titillators long, brownish, haired and pointed towards the tip. The apex of upper appendage with deep, broad and almost rectangular incision. Wings broad with rounded tips. Membrane hyaline with faintly

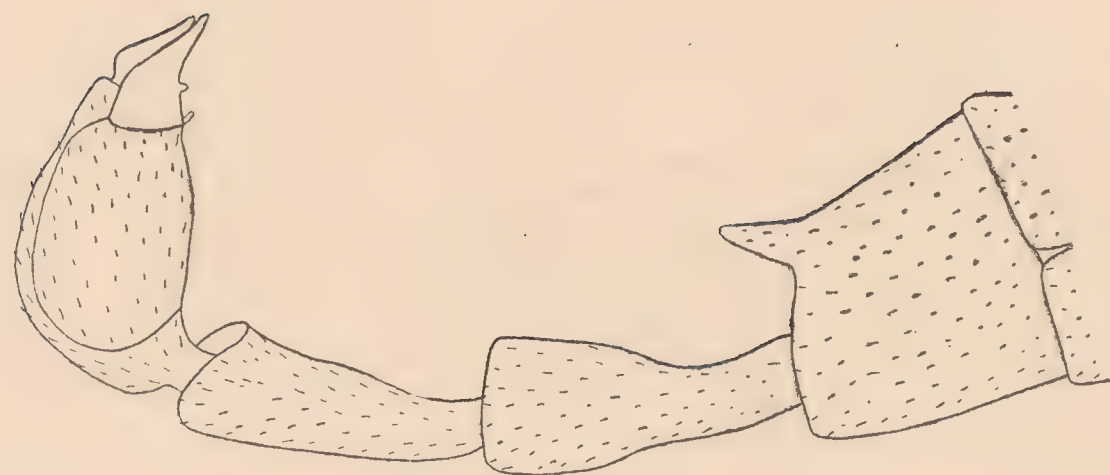


FIG. 63. — *Panorpa cornigera* ♂
Lateral view of abdominal segments
(Museum Zürich)

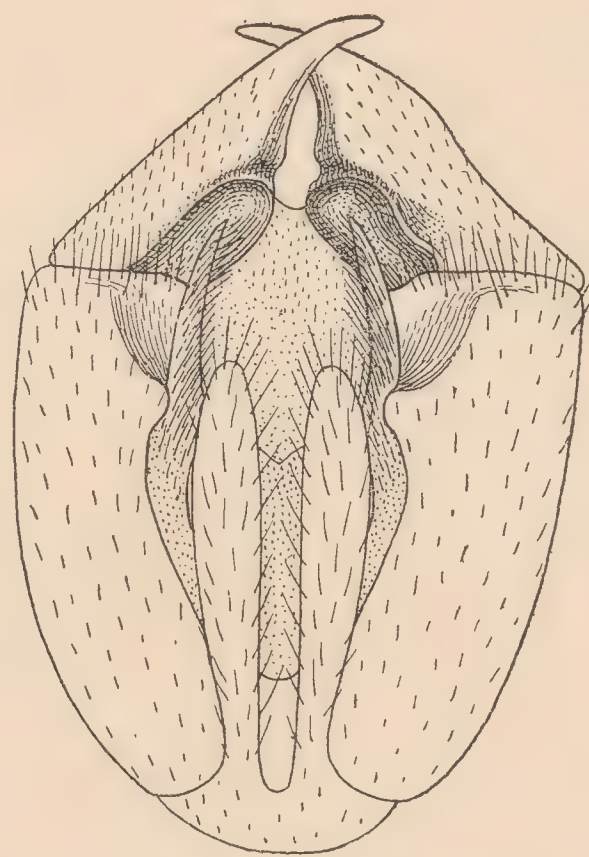


FIG. 64. — *Panorpa cornigera* ♂
Dorsal view of terminal segment
(Museum Zürich).

lacteous tinge. Venation brownish black, basal cross veins yellowish. Markings blackish sooty brown. Ptb oblique, often narrowed in its middle; Abr indicated by a spot at the hind margin; Ab present as a narrow streak along the apical margin, sometimes connected with a larger spot beyond the pterostigma. In the forewing of the male a small spot in the middle of Cu¹ (the rest of Smb). In the forewing of the female two spots (the rest of Smb), and sometimes also a median spot.

Forewing : 14-16^{mm}; hindwing : 13-14^{mm}.

Coll. SELYS : not present. — Mus. Zürich : 1 ♂, 1 ♀ Wladiwostok (types of MAC LACHLAN). — Mus. Paris : 1 ♂ Chuzenji, Japan (type of NAVÁS). — Mus. Leyden : 3 ♀ Jankowsky, South Ussuri. — Mus. Berlin : 1 ♀ Yokohama. — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Japan (ex coll. MIYAKÉ).

MIYAKÉ (*loc. cit.*, p. 339) describes a form of the species as a subspecies *fulvicaudaria*.

« Rostrum, process of the sixth abdominal segment, and seventh to last abdominal segment reddish ochreous. »

Length of body : ♂ 12^{mm}; expanse : 27^{mm}.

The male-type of *P. Galloisi* is a typical specimen of *cornigera*. Its head, rostrum and last abdominal segments almost totally black. I have not seen the variety described by NAVÁS as *P. Galloisi* NAV. *pallida* nov. var. (*loc. cit.*, p. 446), but it seems to be a form, in which the Ptb is interrupted.

[*P. gokaensis* Miyaké].

Panorpa gokaensis MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 193, pl. XI, fig. 3, 3a, 3b (1910) (Japan). — ID., *ibid.*, IV, p. 341, pl. 31, fig. 15, pl. 36, fig. 3 (1913).

« Body totally black; rostrum, antennae and palpi black; legs fuscous yellow, with the extremity of each joint and some terminal tarsi fuscous; claws testaceous.

Wings hyaline, with the apex elliptical; a rather narrow (compared with that of *P. japonica*, etc.) blackish postmedian fascia from the pterostigma to the posterior margin oblique in posteriorly inward direction; in forewing a likewise narrow blackish antemedian fascia is present, slightly oblique in direction contrary to that of the postmedian one, that is in posteriorly outward direction; in the female specimen the fascia is extended from the costal margin backwards, in the male terminating before reaching the posterior margin; a rather small blackish apical patch, with well defined inner edge; the subcosta of forewing extending to the pterostigma; costa, subcosta and radial veins black; the remaining longitudinal veins and transverse veins mostly fuscous yellow except where they cross the fascia, where they are black.

Abdomen rather short, black; in the ♂ the posterior margin of the 3rd dorsal segment is not produced into a lobe (unlike any other of our Panorpids); 6th cylindrical; 7th narrower and longer than 6th and almost equal to 8th; 9th rather smaller but stouter than in *P. japonica*; lateral pieces very stout and rounded; the chelae shorter than the segment, almost straight, being very slightly curved towards the extremity which is testaceous; appendages rather long, slightly curved, approximating at the base and apex. »

Expanse : ♂ 30^{mm}; ♀ 33^{mm}.

Coll. SELYS : not present.

I do not know this species.

[*P. Galloisi* Miyaké].

Panorpa Galloisi MIYAKÉ, The Entomologist, XLIV, p. 93, fig. (1911) (Japan). — ID., Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 342, pl. 34, fig. 10a, 10b, 10c (1913).

« Subcosta of the forewing extended to the pterostigma, as in *P. communis* and *P. cornigera*. Body blackish piceous; rostrum blackish piceous (slightly shorter than that of our other Panorpids), with the palpi piceous; legs testaceous. Wings rather broad (broadest at the pterostigmatal region), whitish with the fuscous veins, with the apex acutely elliptical: the only conspicuous markings (fuscous in colour) are of somewhat quadrate form in the forewing and of a triangular shape in the hindwing and are situated at the pterostigma, which is somewhat opaque, occupying its middle one third; three very insignificant spots found in the forewing, placed obliquely from the pterostigma to the hind margin, the first situated at the middle of the wing and the last at the hind margin.

In the specimen (male) the posterior margin of the third abdominal segment is, so far as I can observe, formed like the other segments, and not produced into a median lobe, as in most of our Panorpids. The fifth and sixth segments stout and obconical, the latter is very conspicuous, and bears a short but prominent spine at the middle of the posterior margin; seventh slender, longer; eighth cylindrical and almost equal in length to the former, ninth (cheliferous segment) stout and rounded (not elongated, as in *P. japonica* and others), the chelae shorter than the segment; appendages long and almost parallel, except towards the end, where they slightly approach each other. »

Expanse : 15^{mm}.

Coll. SELYS : not present.

I do not know this species.

[*P. arakavae* Miyaké].

Panorpa arakavae MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 343, pl. 31, fig. 12, pl. 36, fig. 8 (1913) (Japan).

« Body totally black; eyes piceous; legs ochreous; claws evenly curved, with the apex produced over the teeth; prominent teeth four.

Wings rather broad, hyaline, with the apex elliptical; the basal region of the forewing slightly tinged with ochreous; black markings as follows: — an irregular narrow fascia on the stalk of radius; an inwardly angulate fascia at the juncture of radial sector; the fascia is reduced into two obscure spots in the hindwing; a short fascia in the middle of costa running posteriorly to the middle of wing; pterostigmatal fascia narrow, forked posteriorly at the middle of wing, so that it represents the form of a Λ ; a rather straight fascia from the costa to the posterior margin; apex narrowly margined with black; longitudinal veins except the basal portion blackish fuscous; the rest and cross veins pale; first branch of radial sector with three branchlets.

Abdomen (in the specimen, which is male) very slender; second to fifth segment short, cylindrical, nearly equal in length; sixth large, with a dorsal process as in *cornigera*; seventh and eighth very slender; cheliferous segment as in *cornigera*; chelae large, crossing in a very oblique direction; appendage very slender, the branches widely distant from each other in the middle and slightly approximated on the apices.

Length of body: ♂ 13^{mm}; expanse: 29^{mm}.

Loc.: Sōhon-tōge, Shinano (?).

Coll. SELYS: not present.

I do not know the species.

Species from America, North of Mexico.

The species from America north of Mexico can be divided into three groups. In the two last groups I have paid no attention to the length of the Sc in the forewing, because I have found so much variation with regard to this vein in the species included. In the *rufa*-group (*rufa*, *lugubris*, *nuptialis*) 7th and 8th segments of the ♂ are much elongated. No horn on 6th segment. Subcosta joins the costa much before the pterostigmatal region. In the *nebulosa*-group (*nebulosa*, *maculosa*, *longipennis*, *Banksi*, *latipennis*) no horn on the 6th abdominal segment of the ♂. Wings with irregular markings, rarely in the form of bands. In the *rufescens*-group (*rufescens*, *confusa*, *americana*, *subfurcata*, *venosa*, *canadensis*, *signifer*, *carolinensis*, *virginica*, *claripennis*) a horn on the 6th abdominal segment of the ♂. Wings with more or less regular markings in the form of bands.

P. rufa Gray (fig. 65) (plate II, fig. 14).

Panorpa rufa GRAY, Griffith's Ed. Cuvier's Anim. Kingd. Ins., XV, p. 323, pl. 105, fig. 2 (1883). — WESTWOOD, Trans. Ent. Soc. London, IV, p. 188 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 461 (1853). — HAGEN, Syn. Neur. N. Am., p. 242 (1861). — ID., Stett. Ent. Zeit., p. 377 (1863). — HINE, Bull. Sc. Lab. Den. Univ., XI, p. 246 (1833). — BANKS, Ent. News, p. 171 (1904). — ID., Cat. Neur. Ins. U. S., p. 33 (1907).

Panorpa fasciata KLUG (in part), Abh. Königl. Akad. Wiss. Berl., p. 105 (1836) (nec FABRICIUS). — RAMBUR, Hist. Nat. Ins. Névr., p. 331, pl. 8, fig. 5 (1842) (nec FABRICIUS.)

Head, rostrum, thorax, abdomen and legs reddish brown. Maxillary palpi reddish brown; tip of apical joint black. Rostrum with two pitchy brown, indistinct, longitudinal streaks. Ocelli

surrounded by a small blackish spot. Antennae black or dark brown; the three basal joints paler. Tip of tibiae and of tarsal joints dark brown. Claws serrate. Wings long and narrow, tips elliptical; membrane strongly hyaline, veins yellowish; markings sooty brown. Ab broad, its inner margin curved; Ptb forked in its hind part; Abr often narrowly connected with Ab along the hind margin; Msp large; Smb oblique, in the hindwing connected with a streak extending along the front margin against the base; in the forewing a similar streak, connected with Bsp, which is absent in the hindwing; in the forewing a spot on the posterior margin

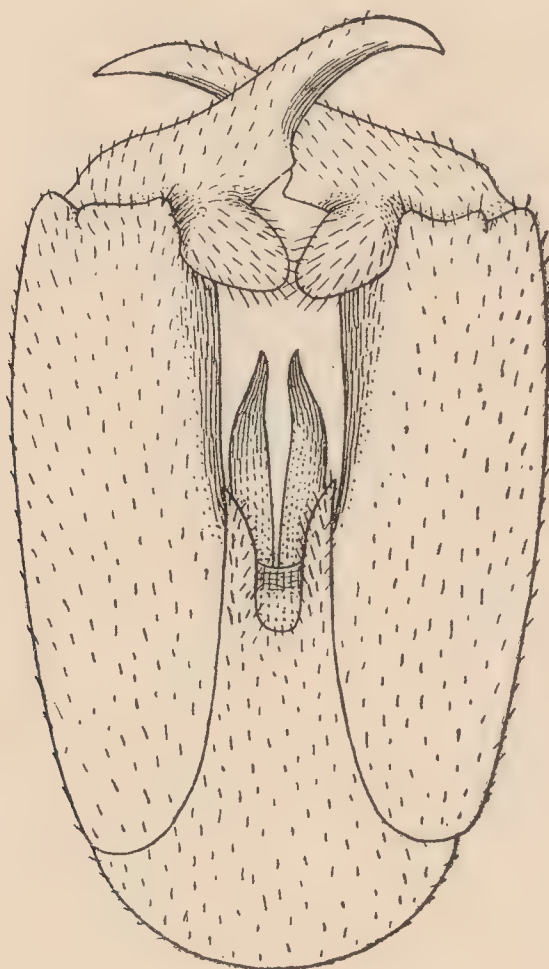


FIG. 65. — *Panorpa rufa* ♂
Ventral view of terminal segment.

opposite to Bsp. In the forewing the subcosta joins the costa before the pterostigmatal region. In the male the hind border of 3rd segment is produced into a broad, short, triangular flap above; 6th segment cylindrical. 7th and 8th of the same length as 6th. 7th thickened towards the apex in its apical half. 8th gradually thickened towards apex. Lower appendage broad, its apex cleft; the branches very short; their apices extend to the middle of basal joint of claspers. Upper appendage long and narrowed towards the apex. Titillators pointed towards their apex.

Forewing : 13-14^{mm}; hindwing : 12-12,5^{mm}.

Coll. SELYS : 1 ♂, 1 ♀ Southern Pines (ex coll. BANKS); 1 ♀ [*P. fasciata* RAMBUR], [*P. americana* WESTWOOD, *fasciata* RAMBUR]. — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Southern Pines, N. Carol. (ex coll. BANKS).

P. lugubris Swed. (plate II, fig. 15).

Panorpa lugubris SWEDERUS, Kgl. Svenska Vetensk. Acad. Handl., VIII, p. 279 (1787). — KLUG, Abh. Königl. Akad. Wiss. Berl., p. 106 (1836). — WESTWOOD, Trans. Ent. Soc. London, IV, p. 188 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 462 (1853). — HAGEN, Syn. Neur. N. Am., p. 241 (1861). — ID., Stett. Ent. Zeit., XXIV, p. 376 (1863). — HINE, Bull. Sc. Lab. Den. Univ., XI, p. 245, pl. LIX, fig. 7 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Panorpa scorpio FABRICIUS, Ent. Syst., II, p. 97 (1793). — BURMEISTER, Handb. Ent., II, p. 927 (1839). — RAMBUR, Hist. Nat. Ins. Névr., p. 331 (1842).

Bittacus scorpio LATREILLE, Gen. Crust. et Ins., III, p. 189 (1807).

Thorax, head, rostrum, maxillary palpi and antennae jet black. In the male the abdomen is dark reddish brown except the terminal segment, which is black; in the female the venter of abdomen and the apical segments black above. Legs brownish black. Claws finely serrate at the base. Wings broad and rather short with rounded apex, sooty black and with jet black veins and white markings. Smb in forewing oblique, sometimes abrupted in its front part; an oblong spot before the pterostigma, and one on the posterior margin behind the pterostigma; hindwings similar, but the oblique band sometimes abrupted. Subcosta in the forewings joins the costa before pterostigma. In the male the hind margin of 3rd abdominal segment is broadly produced above. The pleura of 2nd to 5th segments produced into a strong spine posteriorly. 6th segment subcylindrical; 7th and 8th segments of the same length, a little longer than 6th, gradually broadened towards the apex. Lower appendage broad; its branches short and pointed, not reaching the base of the chelae. Upper appendage very long and narrowed towards the apex. Chelae long and slender.

Forewing : 13-14^{mm}; hindwing : 12-13^{mm}.

Coll. SELYS : 4 ♂, 2 ♀; 1 ♀ [Amer. septr.] [*Panorpa scorpia* FABR.] [*P. lugubris* SWED.; *P. scorpia* FABR., RAMBR.]. — Mus. Stockholm : 1 ♂ Carolina (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Raleigh, N. Carol. (ex coll. BANKS).

***P. nuptialis* Gerst.**

Panorpa nuptialis GERSTAECKER, Stett. Ent. Zeit., p. 187 (1863). — HINE, Bull. Sci. Lab. Den. Univ., XI, p. 246, pl. LIX, fig. 2; pl. LXI, fig. 26, 33 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Head and rostrum reddish brown; maxillary palpi reddish brown; tip of joints blackish. Antennae blackish; basal joints reddish brown. Thorax and abdomen dark reddish brown. Legs reddish brown; tip of tibiae and tarsal joints darker. Claws serrate in their basal part. Wings long and slender; the tip elliptical. Subcosta in the forewings joins the costa before the pterostigmatal region. Membrane with strongly yellowish tinge, yellowish veins and sooty brown markings. Ab broad; Ptb broad, margins nearly straight, not forked in its hind part; marginal spot wedge-shaped; Smb complete, wedge-shaped; from its hind part a streak extends along the hind margin towards the base of the wing; Bsp only present in the forewing; it is connected with a streak, extending towards the base along the front margin; this streak is also present in the hind wing. In the male the hind border of 3rd abdominal segment is produced into a broad lobe above. The pleura of 2nd-5th segments produced into a strong spine posteriorly. 6th segment long, subcylindrical; 7th and 8th of the same length, longer than 6th, broadened towards the tip. The chelae long and slender. Lower appendage broad; its branches very short, not reaching the base of chelae, pointed towards the apex; upper appendage very long, narrowed towards the apex.

Forewing : 16-18^{mm}; hindwing : 14-15^{mm}.

Coll. SELYS : 1 ♂, 1 ♀ Mexico. — Mus. Hamburg : 1 ♂, 1 ♀ Dallas, Texas (BOLL. leg.). — Mus. Stockholm : 2 ♂, 2 ♀ Texas (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Brazos Co., Texas (ex coll. BANKS).

The wing markings are somewhat variable, especially the basal ones. *P. nuptialis* and *P. lugubris* are in many respects similar to the *japonica*-group, f. inst. in the length and shape of the three terminal segments, in the shape of lower appendage, of chelae and of titillators.

P. nebulosa Westw. (fig. 66).

Panorpa nebulosa WESTWOOD, Trans. Ent. Soc. London, IV, p. 191 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 464 (1853). — HAGEN, Syn. Neur. Ins. N. Am., p. 243 (1861). — HINE, Bull. Sci. Lab. Den. Univ., XI, p. 247, pl. LX, fig. 21 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Head and rostrum yellowish brown; maxillary palpi yellowish brown, tip of apical joint black. On vertex a blackish spot enclosing the ocelli. Antennae dark brown or black, basal joints paler. Thorax brown above with darker lateral margins. Abdomen brown above, paler towards apex. Thorax and abdomen ventrally yellowish brown. Legs yellowish; tip of tibiae and of tarsal joints brown. Wings short and rather broad; tips rounded. Membrane with a faint yellowish tinge and with pale brown veins; several of the cross veins are margined with

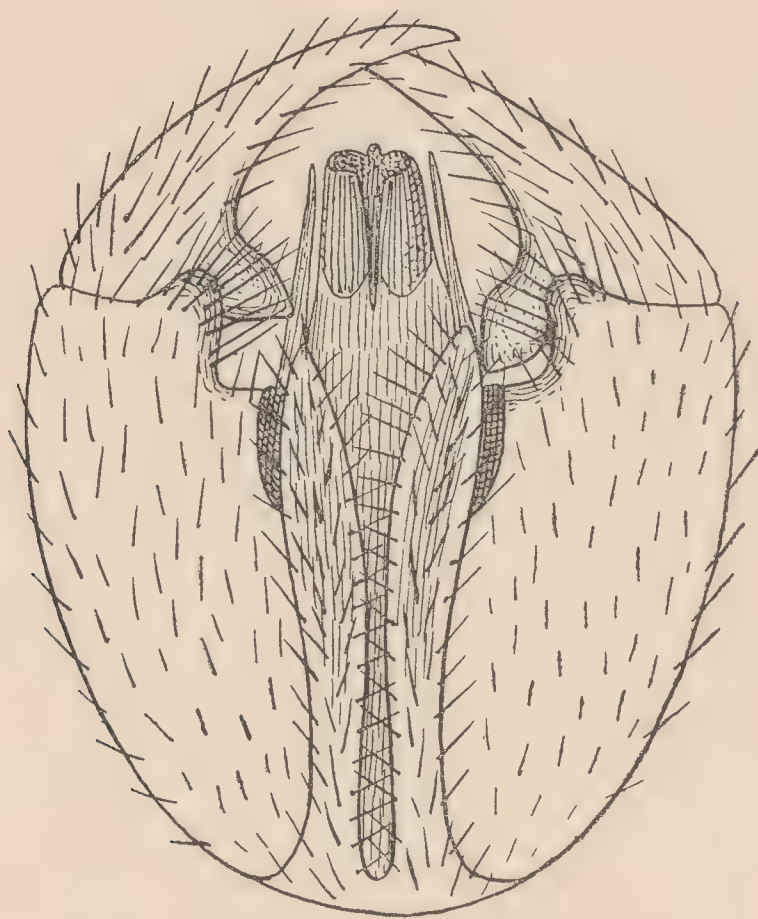


FIG. 66. — *Panorpa nebulosa* ♂
Ventral view of terminal segment.

sooty brown. All the main markings are present, but, as a rule, they are only indicated by numerous small spots. In the forewing Sc generally joins the costa in the pterostigmatal region. In the male the hind border of third abdominal segment is produced into a broad, short, rounded flap above. 6th segment subcylindrical, hardly narrowed towards apex. 7th conical, the base above subemarginate; eighth gradually thickened towards the apex, thinner and a little shorter than seventh; the apex obliquely truncate above. Lower appendage deeply cleft; the branches flattened and pointed at the tip; titillators stout, subcylindrical, straight and rather long; upper appendage with semicircular incision at the tip. Chelae with a large blunt tooth basally on their inner side.

Forewing : 11-12^{mm}; hindwing : 10-11^{mm}.

Coll. SELYS : 1 ♂ (LATREILLE); 1 ♂ Washington (OSTEN-SACKEN leg.); 2 ♂ Trenton Falls (OSTEN-SACKEN leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Mosholu, N. Y.; 1 ♂, 1 ♀ Chain Bridge, Virg.; 1 ♀ White Plains, N. Y. (ex coll. BANKS).

This species has the appearance of *P. maculosa* as to the wing markings, and in the forewings Sc as a rule joins the costa in the pterostigmatal area; but I have males before me, in which Sc runs in to the costa before the pterostigma. In such specimens the likeness to *P. maculosa*, especially in the female sex, is delusory, and I cannot find characters, whereby to distinguish the females of *P. maculosa* and *P. nebulosa*. With regard to the males the shape of anal appendages is very different.

[*P. maculosa* Hagen] (fig. 67).

Panorpa maculosa HAGEN, Syn. Neur. N. Am., p. 245 (1861). — HINE, Bull. Sci. Lab. Den. Univ., XI, p. 247, pl. LIX, fig. 6 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Head and rostrum yellowish brown; maxillary palpi yellowish brown, tip of apical joint blackish. On the vertex a blackish spot enclosing the ocelli. Antennae blackish, basal joint yellowish brown. Thorax brownish above with darker spots at the root of the wings. Abdomen brown above, yellowish towards the apex. Thorax and abdomen ventrally yellowish. Legs yellowish, tip of tibiae and of tarsal joints darker. Wings short and rather broad, with rounded apex. Membrane with a slight yellowish tinge and pale brown

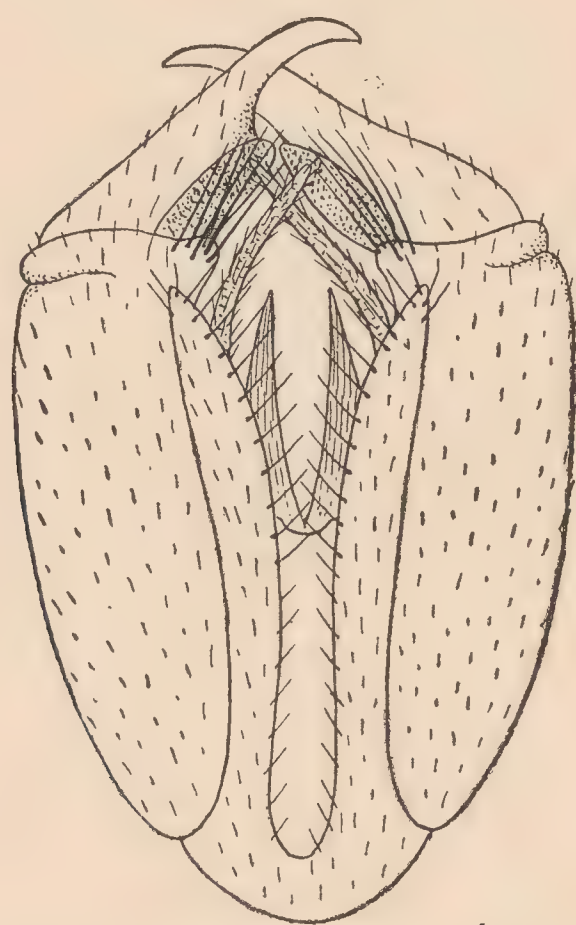


FIG. 67. — *Panorpa maculosa* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

veins; several of the cross veins margined with sooty brown. All the main markings are present, but they are as a rule only indicated by numerous small spots. In the forewing the subcosta joins the costa before the pterostigmatal region. In the male the hind border of 3rd abdominal segment is produced into a short, broad and rounded flap above. 6th segment subcylindrical, narrowed towards apex. 7th and 8th of the same length; 7th conical, the base subemarginate above and the middle slightly emarginate below; 8th more slender than 7th, gradually incrassate towards the apex, which is obliquely truncate above. Lower appendage deeply cleft; the branches curved outwards in their apical part; their inferior margin strongly ciliated in their apical half. Titillators slender, haired. Upper appendage with deep rectangular incision at the tip.

Forewing : 11-12^{mm}; hindwing : 10-11^{mm}.

Coll. SELYS : not present. — Mus. Stockholm : 1 ♂, 1 ♀ Illinois (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Black Mt., 1 ♂, 2 ♀ Rockville (ex coll. BANKS).

[*P. longipennis* Banks].

Panorpa longipennis BANKS, Trans. Am. Ent. Soc., XXXVII, p. 349 (1911) (North Carolina, U. S.).

« The female in general is similar to *P. nebulosa*, but with plainly larger and longer wings, and there are five cross veins in the apex of each forewing; there is a large basal spot, larger than in *P. nebulosa*, two larger spots beyond, a narrow, irregular, pterostigmatal band, the anterior margin of which does not reach the costal edge, an anal spot, and small spots in the apical part of wing that are somewhat connected together, and form irregular apical and preapical bands. Expanse : 35^{mm} ».

I do not know this species.

[**P. Banksi** Hine].

Panorpa Banksii HINE, Bull. Sci. Lab. Den. Univ., XI, p. 247, pl. LXI, fig. 28 (1901). —
BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Panorpa affinis BANKS, Trans. Am. Ent. Soc., XXII, p. 315 (1895) (nec LEACH).

HINE, *loc. cit.* :

« Anterior wing 11^{mm}. Fulvous, abdomen luteous; wings hyaline, veins fuscous, a slender apical band and an interrupted pterostigmatal one, a middle spot on costa, an interrupted band, and a basal spot brown; subcosta runs into costa at middle of the forewing; the radius does not curve inward as much at the pterostigma as in *P. maculosa* and the wing is less slender than in that species. Abdomen short, second segment not produced behind; 6th segment tapering, no projection above; 7th and 8th sub-equal, 7th ob-conical, curved at base, more swollen above than in *P. maculosa*, 8th more regularly conical and not so large; 9th short and broad; forceps stout, appendages reaching to base of claws.

Hab. : Sea Cliff, N. Y. »

I do not know this species.

[**P. latipennis** Hine].

Panorpa latipennis HINE, Bull. Sci. Lab. Den. Univ., XI, p. 248, pl. LIX, fig. 1, 3; pl. LXI, fig. 32 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907) (Michigan, New York).

« Anterior wing : male 14^{mm}, female 16^{mm}. Brown, last three or four abdominal segments lighter, rostrum and basal segments of the antennae brown, remainder of antennae fuscous; coxae fuscous, remainder of legs pale yellow; wings hyaline, apex, a pterostigmal band geniculated at the middle, and abruptly widened at costa, a costal spot, a band interrupted at middle, and a basal spot brown. The apical patch of brown is divided or nearly divided by hyaline, the basal spot is absent on the hind wings, all the wing markings are very narrow and somewhat broken, and most of the veins are brown. There is no horn on the 6th segment of the male ».

I do not know this species.

P. rufescens Ramb. (fig. 68) (plate I, fig. 6).

Panorpa rufescens RAMBUR, Hist. Nat. Ins. Névr., p. 330 (1842). — HAGEN, Syn. Neur. N. A., p. 241 (1861). — HINE, Bull. Sci. Lab. Den. Univ., XI, p. 251, pl. LIX, fig. 10; pl. LX, fig. 11, 12; pl. LXI, fig. 31 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Panorpa debilis WESTWOOD, Trans. Ent. Soc. London, IV, p. 191 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 464 (1853). — HAGEN, Syn. Neur. N. A., p. 243 (1861). — HAGEN, Stett. Ent. Zeit., XXIV, p. 377 (1863)

Head, rostrum and maxillary palpi yellowish brown, apical joint of palpi darker. Ocelli placed in a blackish spot. Antennae blackish brown, the three or four basal joints yellowish brown. Thorax and abdomen dorsally and ventrally varying from pale brown to castaneous brown, apical joint paler. Legs yellowish brown; tip of tibiae and tarsal joints darker. Claws serrate. Wings hyaline with a faint yellowish tinge and elliptical apex. The veins pale brown, and the markings sooty brown. Subcosta joins the costa in the pterostigmatal region. Ab narrow, sometimes enclosing one or two small hyaline spots; Ptb broadest at the front and hind margins; Abr only indicated by a small spot at the hind margin; Msp wedge-shaped; sometimes very small and not present in the hindwing; Smb abrupted in the middle; Bsp small

and not present in the hindwing. In the male the hind border of third abdominal segment hardly produced above. Sixth segment cylindrical, its hind border above produced into a long horn, the lateral margins just below the horn emarginate. Seventh and eighth equal in length, seventh conical, eighth more slender, gradually incrassate towards apex which is obliquely truncate above. Lower appendage deeply cleft; its branches long and slender, reaching the base

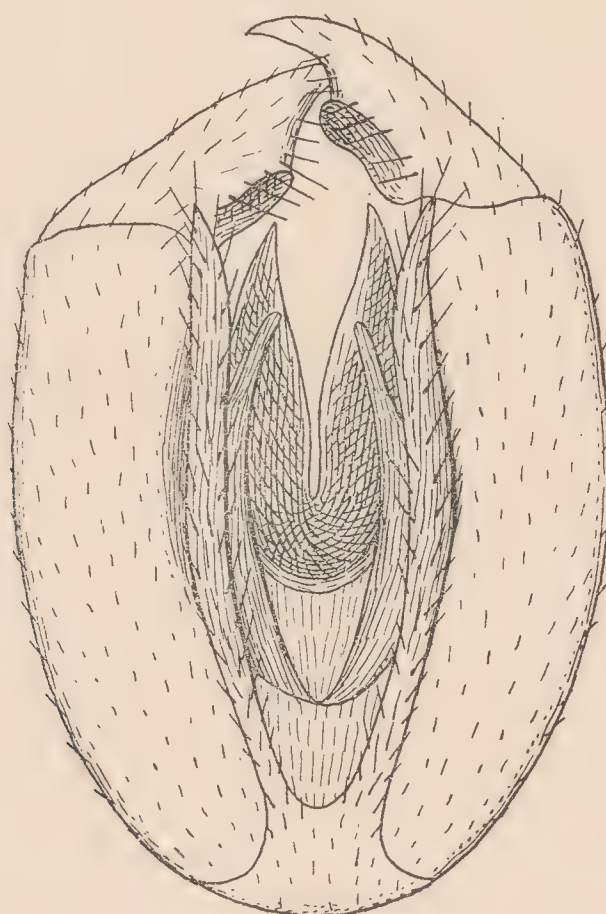


FIG. 68. — *Panorpa rufescens* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

of the cheliferous joints. Titillators slender, subcylindrical. Upper appendage with deep and broad rectangular incision.

Forewing : 11-12^{mm}; hindwing : 10-11^{mm}.

Coll. SELYS : 4 ♂, 5 ♀; 1 specimen (abdomen lost). — Coll. ESBEN-PETERSEN : 1 ♂ Riverton, N. Y., 1 ♀ Chester, N. Y. (ex coll. BANKS).

***P. confusa* Westw. (fig. 69).**

Panorpa confusa WESTWOOD, Trans. Ent. Soc. London, IV, p. 190 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 463 (1853). — HAGEN, Syn. Neur. N. A., p. 244 (1861). — HINE, Bull. Sci. Lab. Den. Univ., XI, p. 251, pl. LX, fig. 13; pl. LXI, fig. 27, 34 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Head and rostrum yellowish brown; maxillary palpi yellowish brown, tip of apical joint blackish; on the vertex a blackish spot enclosing the ocelli. Antennae dark brown or black; the basal joints paler. Thorax and abdomen brown; terminal segments of abdomen yellowish brown. Legs yellowish, tip of tibiae and of tarsal joints brown. Wings rather short and broad; tip rounded. Membrane with yellowish tinge; veins yellowish brown; the greater part of cross veins, especially in the forewing, margined with fuscous; markings sooty brown. Ab rather narrow, enclosing several hyaline spots; its inner margin irregular. Ptb very narrow in the middle, where it is geniculated or interrupted; if so, the branches are only indicated by two spots on the posterior margin. Msp very small. Smb interrupted in its middle. Bsp wanting in the hindwing. In the forewing subcosta joins the costa in the pterostigmatal region. In the male the hind border of 3rd abdominal segment is produced into a short and broad flap above. 5th segment cylindrical; its hind margin is produced into a horn above. 7th and 8th of equal

length; 7th slender at base, its apical half conical; 8th gradually thickened towards apex. Lower appendage deeply cleft; its branches flattened, reaching the base of the cheliferous

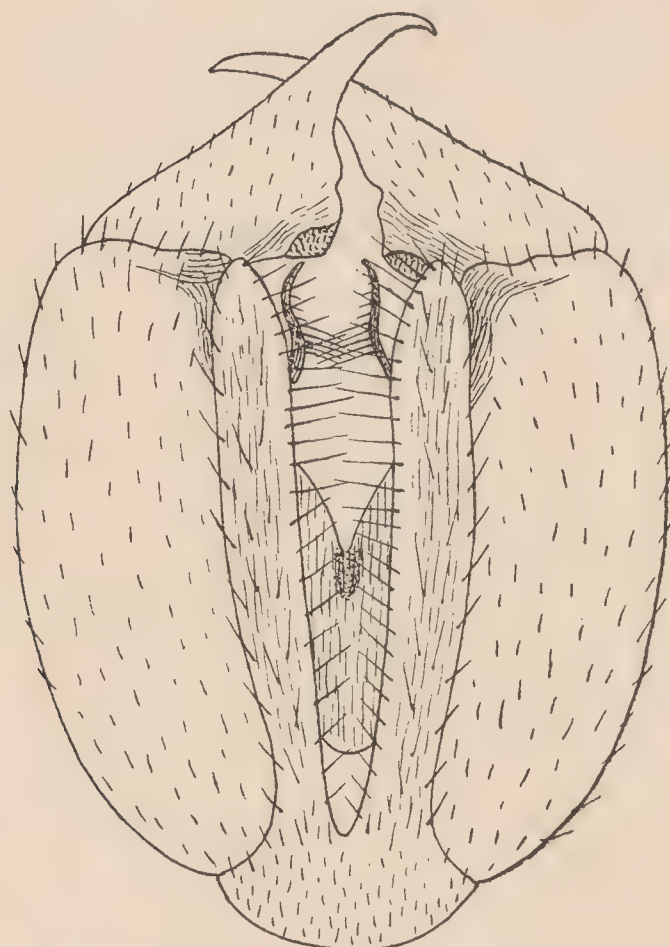


FIG. 69. — *Panorpa confusa* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

joints. Titillators slender, pointed and irregularly curved. Upper appendage deeply and broadly excised.

Forewing : 10-12^{mm}; hindwing : 9-11^{mm}.

Coll. SELYS : 1 specimen (abdomen lost) [LATREILLE]. — Mus. Stockholm : 2 ♀ N. Jersey (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 2 ♂, 2 ♀ Glencarlyn, Virg.; 4 ♂, 1 ♀ Falls Church, Virg. (ex coll. BANKS).

[*P. americana* Swed.].

Panorpa americana SWEDERUS, Kongl. Svenska Akad. Handl., VII, p. 279 (1784). — WESTWOOD, Trans. Ent. Soc. London, IV, p. 189 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 463 (1853). — HAGEN, Syn. Neur. Ins. N. A., p. 242 (1861). — ID., Stett. Ent. Zeit., XXIV, p. 377 (1863). — HINE, Bull. Sc. Lab. Den. Univ., XI, p. 250, pl. LIX, fig. 5 (1901), — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Panorpa fasciata FABRICIUS, Ent. Syst., II, p. 98 (1793). — KLUG, Abh. Königl. Akad. Wiss. Berl., p. 105 (1838) (in part).

Head and rostrum reddish brown; ocelli enclosed by a blackish spot. Antennae blackish; the three basal joints reddish brown. Thorax and abdomen reddish brown. Legs reddish brown; the tip of tarsal joints narrowly blackish. Wings short, broad and with rounded tip. The membrane with strongly yellowish tinge, brownish yellow veins and sooty brown markings. The subcosta joins the costa in the pterostigmatal region. Ab with incurved inner margin; Ptb has everywhere the same breadth; it is placed at a right angle to the hind margin of wing and not forked in its hind part; Msp small and narrow, only present in the forewing; Smb complete and rather broad; Bsp present in the forewing, large, extending to the front margin of the wing. In the male the hind margin of 6th abdominal segment is produced above into an erected horn; 7th and 8th conical. Lower appendage broad at base; its two branches long and slender. Titillators cleft; their branches broad. Upper appendage sub-rectangular; its apex deeply and broadly incised.

Forewing : 11.5-12^{mm}; hindwing : 10-11^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Southern Pines (ex coll. BANKS).

[*P. subfurcata* Westw.] (fig. 70).

Panorpa subfurcata WESTWOOD, Trans. Ent. Soc. London, IV, p. 191 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 464 (1853). — HAGEN, Syn. Neur. Ins. N. A., p. 244 (1861). — HINE, Bull. Sc. Lab. Den. Univ., XI, p. 249, pl. LXI, fig. 25, 30 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Head and rostrum pale brown, tip of the latter dark; a blackish spot on the vertex enclosing the ocelli. Antennae black, the two basal joints yellowish brown. Thorax and abdomen brown, the latter paler towards the apex. Legs pale brown; tip of tarsal joints darker. Wings rather broad with rounded apex, hyaline with a faint yellowish tinge, yellowish venation and sooty brown markings. Ab rather narrow; Ptb forked in its posterior part; Abr only indicated by a streak on the hind margin; Bbr prolonged along the hind margin into a short streak; Msp large; a very small marginal spot in the forewing nearer to the base, but behind Smb,

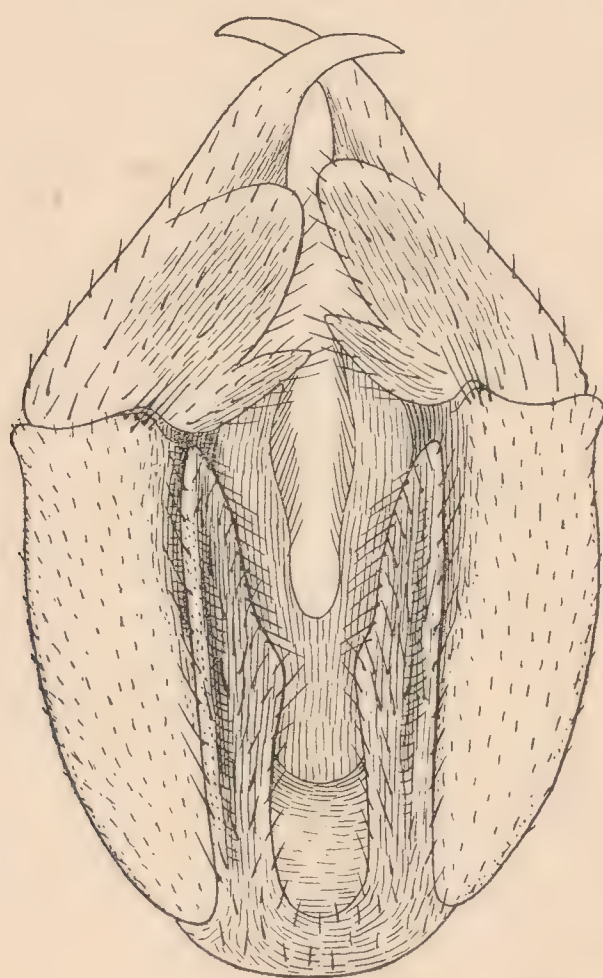


FIG. 70. — *Panorpa subfurcata* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

which is irregularly arcuate, interrupted in the hindwing; Bsp larger. In the forewing subcosta joins the costa in the pterostigmatal region. In the male the hind border of 3rd abdominal segment produced above into a broad, short flap. 6th segment rather short, hind border produced into a somewhat curved horn above. 7th and 8th segments longer than 6th; 7th strongly thickened in its apical half towards apex; 8th gradually thickened towards apex. Lower appendage broad, deeply cleft; the branches flattened; their inner margin broadened in the middle. Titillators broad, their inner margin with bristles. Upper appendage short and broad; its apex truncate. Cheliferous segments with two lobes, a narrow and pointed one at the base, and a broader one about in the middle.

Forewing : 14^{mm}; hindwing : 12^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♂ Franconia, New Hampsh. (ex coll. BANKS).

P. venosa Westw. (fig. 71).

Panorpa venosa WESTWOOD, Trans. Ent. Soc. London, IV, p. 190 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 463 (1853). — HAGEN, Syn. Neur. N. A., p. 242 (1861). — ID., Stett. Ent. Zeit., XXIV, p. 377 (1863). — HINE, Bull. Sc. Lab. Den. Univ., XI, p. 250, pl. LIX, fig. 4, pl. LX, fig. 18, 23, pl. LXI, fig. 38 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907)

Panorpa fasciata KLUG (in part), Abh. Königl. Akad. Wiss. Berl., p. 105 (1836) (nec FABRICIUS).

Head, rostrum, thorax, abdomen and legs brown or yellowish brown. Maxillary palpi yellowish brown, tip of apical joint darker. Ocelli black. Antennae dark brown or black; the three basal joints darker. Tip of tibiae and of tarsal joints dark brown. Wings rather broad and short, apex rounded; membrane with yellowish tinge; venation yellowish brown; markings sooty brown. Ab rather narrow, inner margin irregularly arcuate; Ptb forked in its hind part; Abr often interrupted (only a marginal spot present); Msp very small or totally absent in the

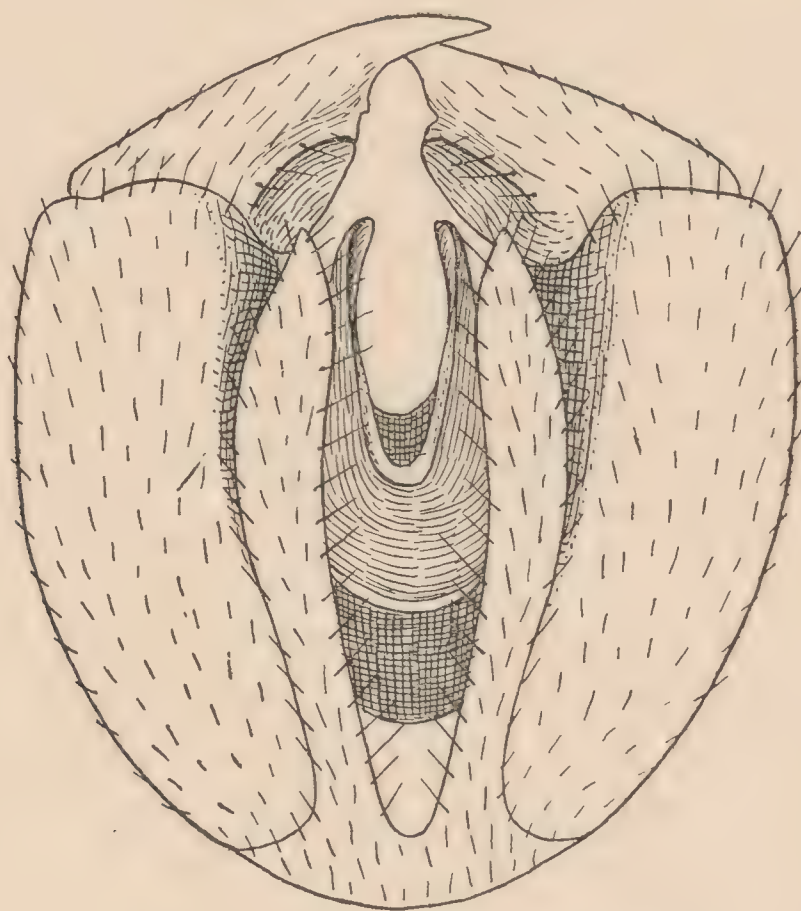


FIG. 71. — *Panorpa venosa* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

hindwing; Smb complete; Bsp in the forewing (absent in the hindwing) rather large, and a smaller spot nearer to the base on the front margin. In the forewing subcosta joins the costa in the pterostigmatal region. In the male the hind border of 3rd abdominal segment is produced into a broad and short flap above. 6th segment rather long, subcylindrical; its hind margin produced into a horn above; 7th segment conical; 8th segment gradually thickened towards apex. Lower appendage broad at base, deeply cleft; its branches flattened, somewhat curved and reaching the base of the cheliferous segments. Titillators rather broad. Upper appendage broad, deeply and broadly incised at tip.

Forewing : 11-12^{mm}; hindwing : 10-11^{mm}.

Coll. SELYS : 1 ♀ Iowa (WICKHAM leg.). — Mus. Leyden : 2 ♀ Wisconsin. — Mus. Stockholm : 1 ♂, 2 ♀ Wisconsin (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ South Pines, N. Carol. (ex coll. BANKS).

***P. canadensis* Banks (fig. 72).**

Panorpa canadensis BANKS, Trans. Am. Ent. Soc., XXII, p. 315 (1895). — HINE, Bull. Sc. Lab. Den. Univ., XI, p. 252, pl. LX, fig. 24, pl. LXI, fig. 39 (252). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Head and rostrum yellowish brown. On the vertex a black spot, enclosing the ocelli. Antennae black; the basal joints paler. Thorax and abdomen yellowish brown. Legs yellowish;

tip of tibiae and of tarsal joints brown. Wings slender, gradually broadened towards apex, which is rounded. Membrane with yellowish tinge, yellowish longitudinal veins, darker cross veins (in forewing) and pale sooty brown markings. Ab narrow, with several hyaline spots. Ptb very narrow in its middle, often interrupted in the hindwing; Abr not visible in the hindwing; in the forewing indicated by a small spot on posterior margin; Msp small, absent in the hindwing; Smb indicated by two spots, of which only the anterior one is present in the hindwing (very small); Bsp very small, absent in the hindwing. Subcosta in forewing joins the costa in the pterostigmatal region. In the male the hind border of 3rd abdominal segment is hardly

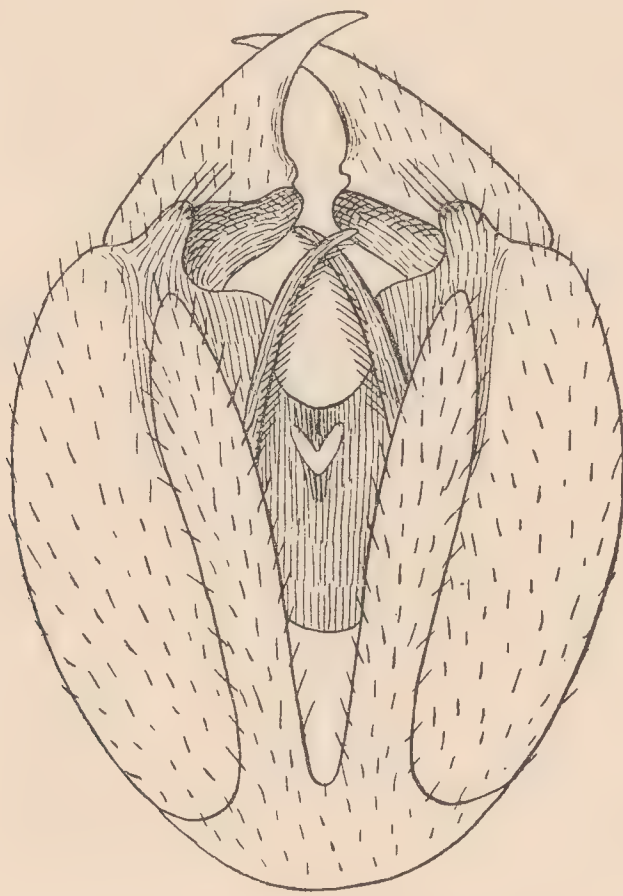


FIG. 72 — *Panorpa canadensis* ♂
Ventral view of terminal segment
(Coll. Selys).

produced above. 6th segment cylindrical; its hind margin produced into a horn above; 7th slender at base, quite suddenly swollen above in its apical half; 8th gradually thickened towards apex. Lower appendage deeply cleft; its branches flattened and pointed at apex, not reaching the base of cheliferous segments. Titillators slender, pointed, and haired along their inferior margin. Upper appendage broadly and deeply incised at apex.

Forewing : 11^{mm}; hindwing : 10^{mm}.

Coll. SELYS : 1 ♂ [*P. fasciata* A. FITCH]. — Mus. Leyden : 2 ♀ Toronto. — Coll. ESBEN-PETERSEN : 1 ♂ Catskills (ex coll. BANKS).

[*P. signifer* Banks] (fig. 73).

Panorpa signifer BANKS, Trans Am. Ent. Soc., XXVI, p. 251 (1900). — HINE, Bull. Sc. Lab. Den. Univ., XI, p. 249, pl. LIX, fig. 8, pl. LX, fig. 12 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Head and rostrum yellowish brown; maxillary palpi yellowish brown, the tip of apical joint blackish; on the front a blackish spot enclosing the ocelli. Antennae dark brown or black; the two basal joints pale. Thorax and abdomen brown, tip of abdomen paler. Legs yellowish brown; tip of tibiae and of tarsal joints darker. Wings slender with elliptical apex, hyaline with a faint yellowish tinge especially towards the base; venation yellowish brown; markings sooty brown. Ab rather broad and with irregular inner margin, sometimes enclosing a hyaline spot; Ptb forked in its hind part, the branches wide apart at their base; Msp large; Smb sometimes interrupted in its middle; Bsp and a marginal spot at the posterior margin only present in the

forewing. In forewing subcosta joins costa in the pterostigmatal region. In the male the hind border of 3rd abdominal segment is broadly produced above. 6th segment rather short, the hind margin produced into a short horn above; 7th segment conical; 8th segment thickened towards the apex. Lower appendage deeply cleft; the branches flattened, pointed at their apex, not reaching the base of cheliferous segments. Upper



FIG. 73. — *Panorpa signifer* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

titillator long and slender, linear; lower titillators flattened and pointed towards apex. Upper appendage deeply and broadly incised at apex. The cheliferous segments with a broad lobe near the base.

Forewing : 12-13^{mm}; hindwing : 11-12^{mm}.

Coll. SELYS : not present. — Mus. London : 1 ♂, 1 ♀ N. Scotia. — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ New-York (ex coll. BANKS).

[*P. carolinensis* Banks].

Panorpa carolinensis BANKS, Bull. Am. Mus. Nat. Hist., XXI, p. 216 (1905). — Id., Trans. Am. Ent. Soc., XXXII, p. 8 (1906). — Id., Cat. Neur. Ins. U. S., p. 33 (1907).

Head and rostrum yellowish brown. On vertex a blackish spot enclosing the ocelli. Antennae brownish black. Thorax yellowish brown; abdomen and legs yellowish; tip of tibiae and of tarsal joints brown. Wings rather long and slender, tip elliptical; membrane hyaline, whitish with dark venation and sooty brown markings. Ab rather broad; Ptb very broad, forked in its hind part; Bbr broad; Msp large and wedge-shaped; Smb broad, almost straight; Bsp large, quadratic (absent in the hindwing). In the forewing is another spot on the posterior margin opposite to Bsp, and nearer to the base a narrow streak along the hind margin. In forewing subcosta joins costa in the pterostigmatal region.

Forewing : 13^{mm}; hindwing : 11^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♀ Nt. Graybeard, N. Carol. (ex coll. BANKS).

I have only seen a female and am, therefore, not able to say anything about the male. BANKS mentions that the 5th segment in the male has a horn above. As to the shape and markings of wings the species is nearest allied to *P. virginica*, but the hyaline membrane, the broad Ptb and Smb (the latter not geniculate) are good characters.

[*P. virginica* Banks] (fig. 74).

Panorpa virginica BANKS, Psyche, p. 99 (1906). — Id., Cat. Neur. Ins. N. A., p. 33 (1907).

Head and rostrum yellowish brown; maxillary palpi yellowish brown, tip of apical joint blackish. Ocelli enclosed by a dark spot. Antennae blackish; the two basal joints yellowish brown. Thorax and abdomen yellowish brown. Legs yellowish; tip of tibiae and tarsal joints darker. Claws serrate. Wings slender with elliptical apex. Membrane with yellowish tinge; venation a little darker; markings sooty brown. Ab rather broad; Ptb forked in its hind part, but Abr only indicated by a marginal spot; Msp on the front margin, large and triangular in forewing, small and linear in hindwing; Smb nearly interrupted in its middle; Bsp present in forewing. A small marginal spot in forewing near to the base. Subcosta joins the costa in the pterostigmatal region. In the male the hind border of 3rd abdominal segment broadly produced above. 6th segment rather short; its apical margin with a raised, somewhat curved horn above; 7th segment long; its apical part broadened towards apex; 8th segment gradually thickened towards apex. Lower appendage

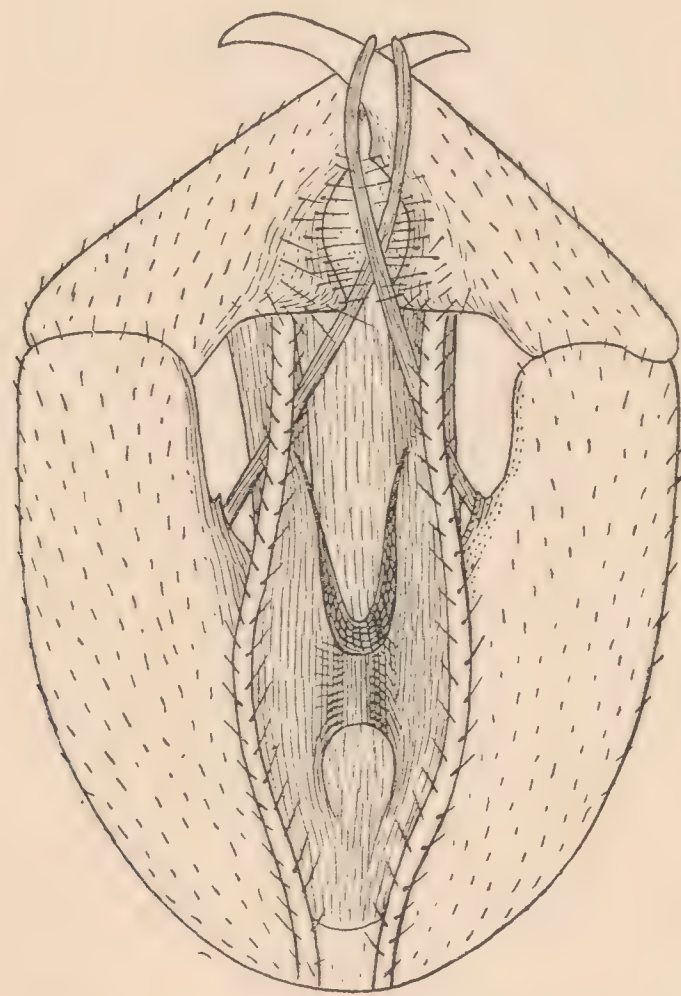


FIG. 74. — *Panorpa virginica* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

broad at base, deeply cleft; its two branches very long and slender, reaching the base of cheliferous segments. Upper appendage broadly and deeply incised at the apex. Titillators very long and slender, nearly reaching the tip of cheliferous segments.

Forewing : 12^{mm}; hindwing : 10,5^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♂ Falls Church, Virg.; 1 ♂ Highlands, N. Carol.; 1 ♀ Chain Bridge, Virg. (ex coll. BANKS).

[*P. claripennis* Hine.]

Panorpa claripennis HINE, Bull. Sci. Lab. Den. Univ., XI, p. 252, pl. LX, fig. 14; pl. LXI, fig. 36 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907) (Canada).

« Anterior wing of male 13 mm. General colour light brown, darker on notum; apex of tibia and tarsal joints black. Antennae black, excepting the two basal joints which are coloured like the head; wings hyaline, a very minute basal spot, a band interrupted before the middle, a minute spot in third interspace, an oblique pterostigmal spot widened before and behind, some scattered spots, and extreme apex dark brown on the forewing. Band before middle almost obsolete, and pterostigmal band widely interrupted on the hind wings. The form of the wings in this species is peculiar in that the posterior border is nearly a regular curve from base to apex, making the wing wide near the middle ».

I do not know this species.

Mexican species.

[*P. terminata* Klug] (fig. 75).

Panorpa terminata KLUG, Abh. Königl. Akad. Wiss. Berl., p. 106 (1836). — WESTWOOD, Trans. Ent. Soc. London, IV, p. 189 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 463 (1853).

Head, rostrum and thorax brown; maxillary palpi brown, the apical joint darker at the tip. Antennae black; the basal joint brown. Legs pale brown; the tip of tibiae and tarsal joints blackish. The wings short and broad, obtuse at tip. Membrane with brownish yellowish tinge. Venation blackish brown. Pterostigma

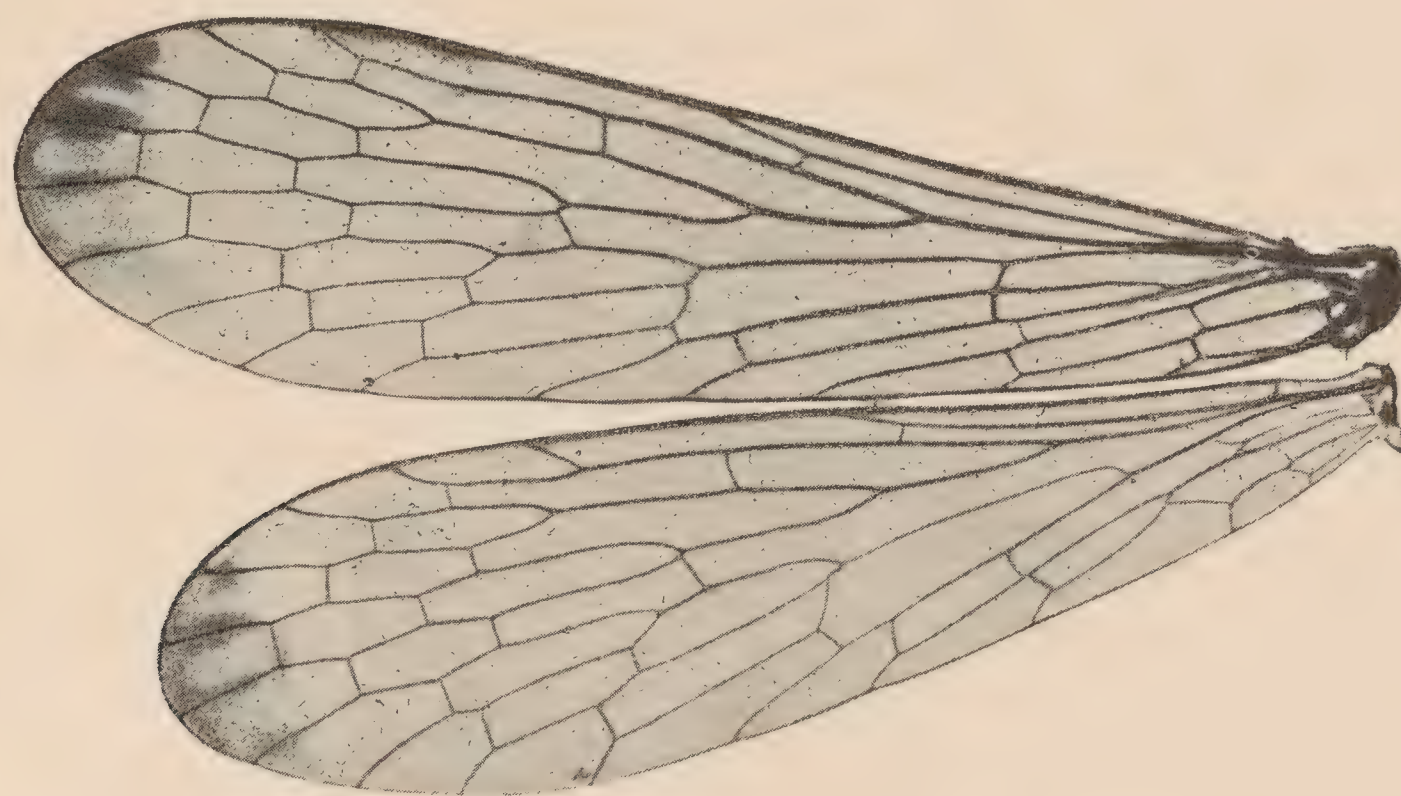


FIG. 75. — *Panorpa terminata* ♀ type-specimen (Museum Berlin).

dark orange. Ptb dark smoky, brown, subtriangular, extending in the forewing to about the middle of the wing, in the hindwing to the 1st branch of radial sector. Ab narrow and dark smoky brown with inner margin almost straight.

Forewing : 15^{mm}; hindwing : 14^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 specimen (abdomen lost), Tepic, Mexico (DIGUET leg.).

The description given above is made from the specimen in the Museum Paris. The markings of wings are more distinct than those in the type-specimen.

[*P. punctata* Klug] (fig. 76).

Panorpa punctata KLUG, Abh. Königl. Akad. Wiss. Berl., p. 105 (1836). — WESTWOOD, Trans. Ent. Soc. London, IV, p. 188 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 462 (1853). — HAGEN, Syn. Neur. N. A., p. 244 (1861).

KLUG, *loc. cit.*

« Nur ein weibliches Exemplar, etwas kleiner als *P. communis*, sonst ebenso gestaltet. Gelbbraunlich,

die Beine hellgelblich, die Fühler schwarz. Die Basis des Hinterleibes dunkler und einige Flecke auf dem



FIG. 76. — *Panorpa punctata* ♀ type-specimen
(Museum Berlin).

Halsschilde schwärzlich. Die Flügel durchscheinend, mit schwach bräunlichem Anflug, die Nerven und ein runder Punkt in jeder Flügelzelle matt schwarz. »

Coll. SELYS : not present. — Mus. Berlin : Mexico.

[***P. immaculata*** Esben-Peters.] (fig. 77, 78, 79).

Panorpa immaculata ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 225 (1915).

Head and rostrum yellowish; a black cross band above the antennae, extending along the inner margin of the vertex; rostrum with two lateral longitudinal bands; maxillary palpi long, brown; apical joint with

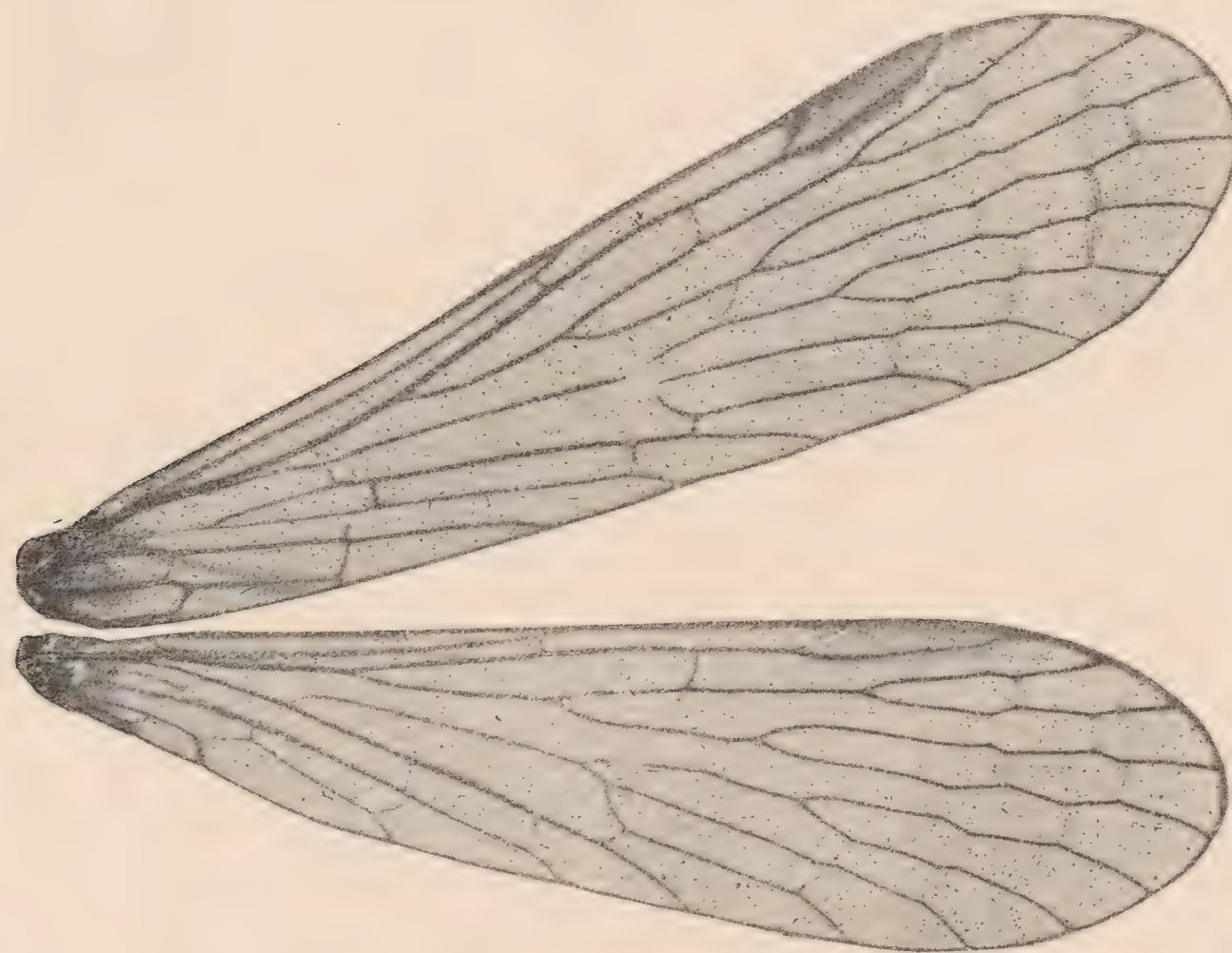


FIG. 77. — *Panorpa immaculata* ♂ type-specimen
(Museum London).

blackish tip. Antennae blackish; the basal joint yellowish, second joint brownish with yellowish base. Thorax blackish above, with a broad yellowish median streak. Sides of thorax greyish yellow. Legs testaceous; tip of tarsal joints brown. Claws serrate. Abdomen in ♂ pitchy brown above, yellowish brown below; 6th segment pitchy brown below; 7th, 8th and 9th brownish yellow; sometimes the tip of 7th and 8th is somewhat reddish brown above. Hind margin of third abdominal segment a little produced above; 4th segment above with a small tubercle at the tip of the prolongation. 6th segment cylindrical narrowed towards apex, which is a little obliquely truncate at the apex above. 7th and 8th segments of equal length, united as long as 6th, narrowed from the middle towards base. Lower appendage very short, with very long stalk. Upper appendage long, its

apex incised. Titillators narrow, linear and pointed. In the ♀ the abdomen is pitchy brown above, yellowish brown below, the 4th and 5th segments greyish yellow, the last four reddish yellow. Setae black. Wings with

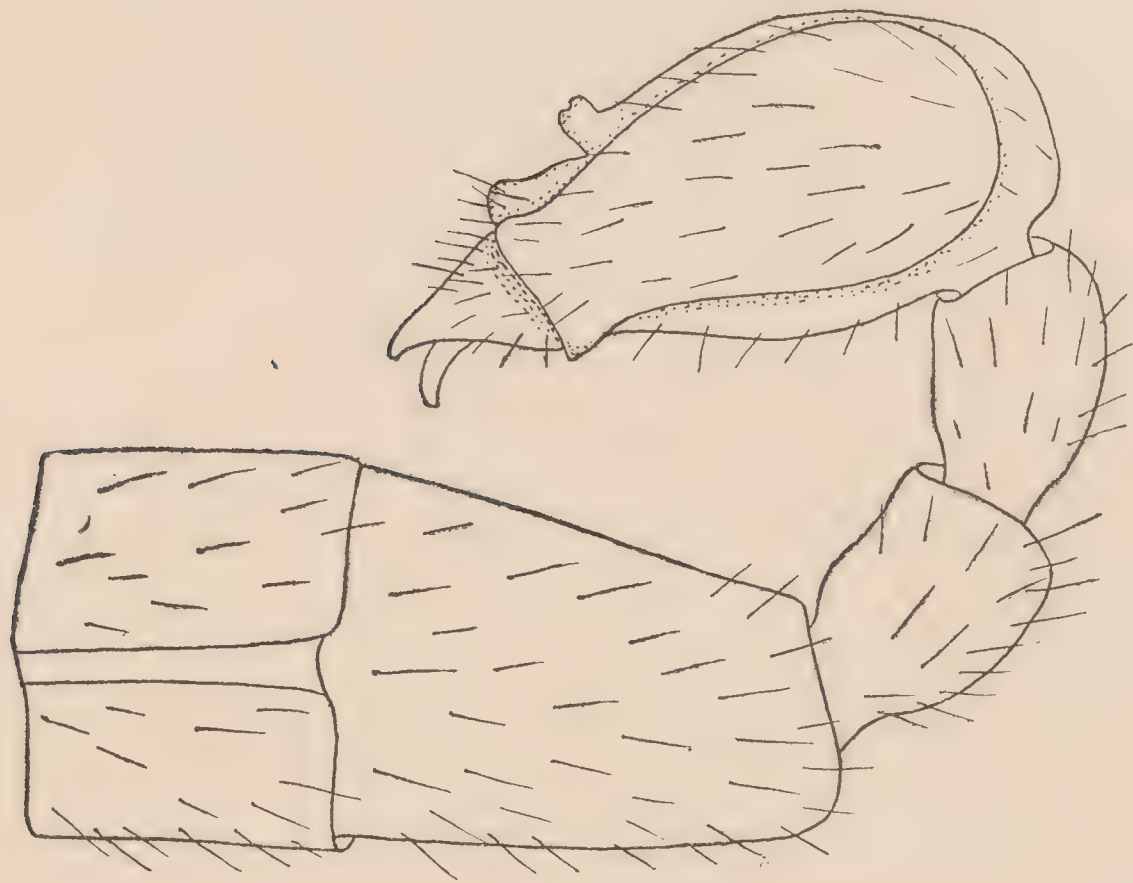


FIG. 78. — *Panorpa immaculata* ♂ type-specimen
Lateral view of abdominal segments
(Museum London).

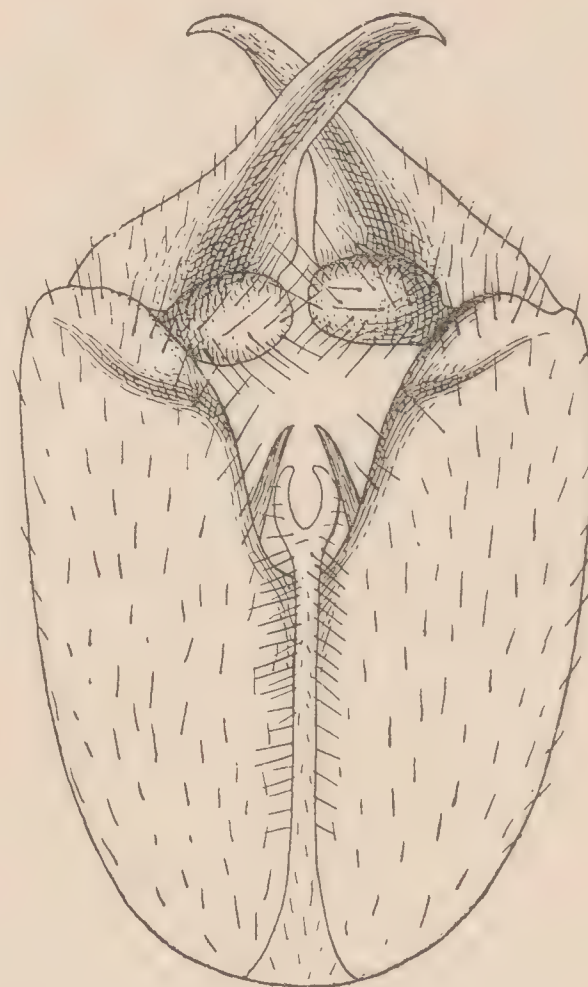


FIG. 79. — *Panorpa immaculata* ♂ type-specimen
Ventral view of terminal segment
(Museum London).

a faint yellowish grey tinge, rounded apex, dark brown venation and without markings. Pterostigma yellowish. In the forewings subcosta joins costa in the middle of the wing.

Forewing : 13-14^{mm}; hindwing : 12-13^{mm}.

Coll. SELYS : not present. — Mus. London : 12 ♂, 11 ♀ Guerrero, Mexico 6-8000 feet (H. H. SMITH leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ from the same locality.

[*P. mexicana* Banks].

Panorpa mexicana BANKS, Trans. Am. Ent. Soc., XXXIX, p. 234 (1913) (Mexico).

BANKS, *loc. cit.* :

« Pale yellowish; antennae, except basal two joints, black; thorax unspotted; wings hyaline, a transverse brown spot over forking of radial sector, a narrow band below basal part of stigma, somewhat bent and interrupted beyond the middle, extreme apex very narrowly brown, and a narrow brown band before tip (in one wing interrupted); venation black, the five cross-veins in apical part of wing pale; stigma pale yellowish. Wings slender; the subcosta runs into the costa much before stigma in all the wings; stigma long and slender; radial sector connected back to radius twice, once at stigma; behind the basal connection is a cross-vein between the lower branch of the radial sector and upper branch of median, the forking of median hyaline. Fifth abdominal segment without tooth or process, sixth rather short, seventh more slender than usual. Expanse 25^{mm}. »

Genus **NEOPANORPA** Weele.

WEELE, Notes Leyd. Mus., XXXI, p. 4 (1909). — ESBEN-PETERSEN, Ibid., XXXV, p. 226 (1913).

Campodotecnium ENDERLEIN, Zool. Anz., XXXV, p. 391 (1910). — ID., Notes Leyd. Mus., XXXIV, p. 235 (1912).

Rostrum long and slender. Claws serrate internally. Abdomen in both sexes not longer than the wings. In the male the hind border of third abdominal segment always produced into

a slender subcylindrical prolongation, the length of which is very different in the different species. 6th, 7th and 8th abdominal segments in the male modified. Subcosta as a rule joins the costa in the pterostigmatal area. 1A joins the hind margin far before the origin of radial sector. Between 1A and 2A one cross vein. R2a is often forked close to the margin of the wing. Wings more or less marked with bands and spots, slender and narrow, especially at the base. In the male the lower appendage is broad; its branches broad, stout, as a rule more or less overlapping each other and covering the titillators.

Habitat : South-East Asia and Insulinde.

Type : *N. angustipennis* WESTW.

Javanese species.

[*N. angustipennis* Westw.] (fig. 80).

Panorpa angustipennis WESTWOOD, Trans. Ent. Soc. London, IV, p. 6 (1852). — WEELE, Notes Leyd. Mus., XXXI, p. 5, fig. 1, pl. 1, fig. 1 (1909).

Campodotecnium angustipenne ENDERLEIN, Notes Leyd. Mus., XXXIV, p. 235 (1912).

Neopanorpa angustipennis ESBEN-PETERSEN, Notes Leyd. Mus., XXXV, p. 227 (1913).

Head black; rostrum pitchy brown with paler lateral margins; maxillary palpi brown, tip of apical joint blackish. Antennae black; the basal joint testaceous; the second joint brown. Thorax black above; its

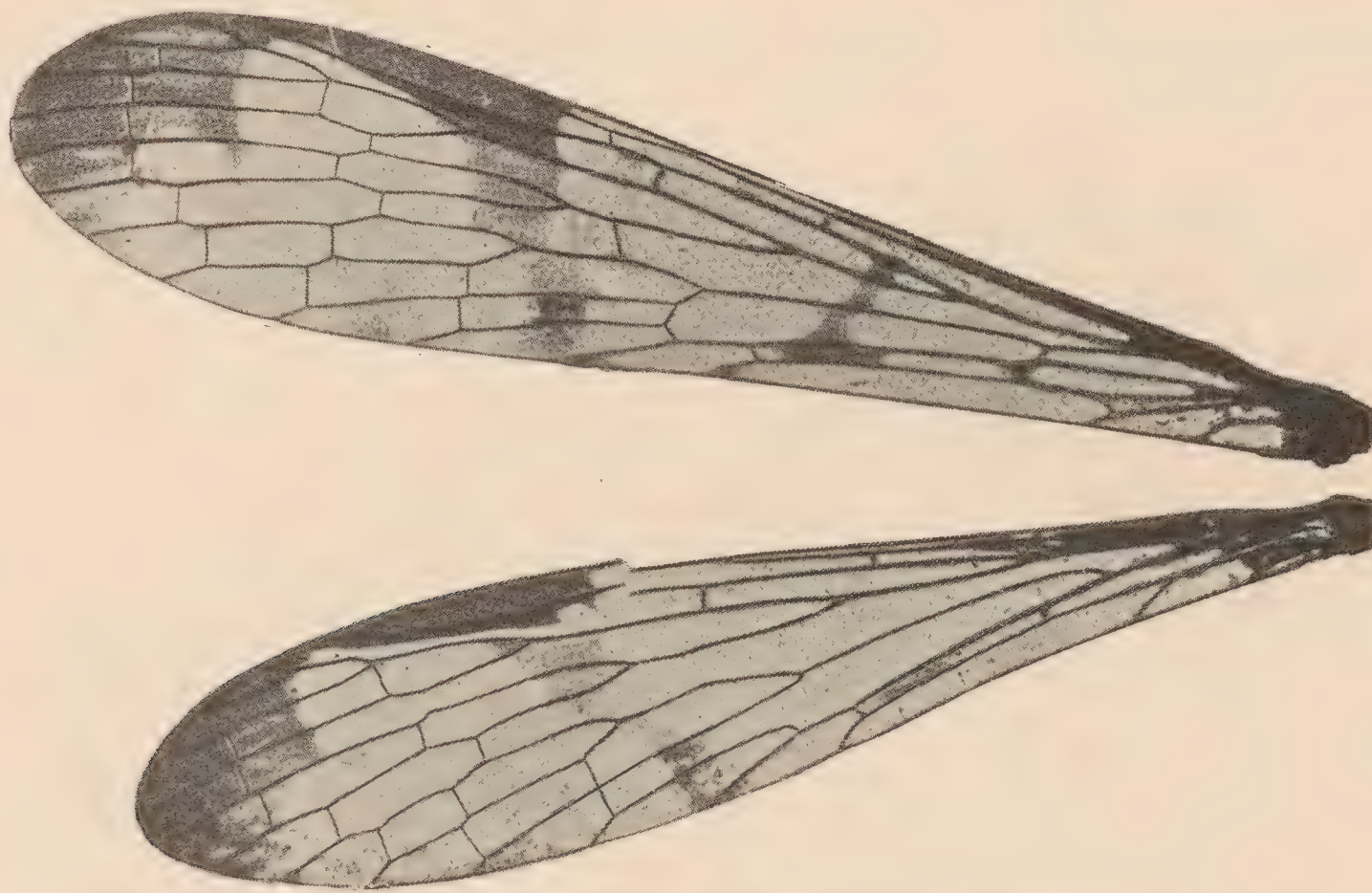


FIG. 80. — *Neopanorpa angustipennis* ♂
(Museum Copenhagen).

sides testaceous. In the female the abdomen is black above; 2nd to 5th segments strongly yellowish ventrally; 6th black and 7th to 9th dark brown. In the male 2nd to 6th segments dorsally black, ventrally strong yellowish with the exception of the 6th which is black; 7th and 8th pale brown becoming darker towards their tip; 9th pitchy black. Hind margin of 3rd abdominal segment in the male produced into a slender cylindrical prolongation, reaching the middle of next segment which is provided with a tubercle in the middle of its dorsum. 6th segment cylindrical, a little narrowed towards apex. 7th and 8th of the same length, shorter than 6th, gradually incrassate towards their apex; tip of 8th segment obliquely truncate above. Branches of lower appendage stout; upper appendage with rounded tip. Legs testaceous; tip of tarsal joints blackish brown. Wings long and slender with elliptical apex, with dark brown venation and sooty black markings. Ab narrow, its inner margin oblique with a pointed prominency; along the front margin Ab connected with Ptb. In the typical form Ptb forked in its posterior part; very often, however, Abr is only indicated by a spot at the hind margin, and this spot is sometimes also absent. Msp not present. In the forewing

Smb is present in the typical form, and the posterior end of which extends into an oblong longitudinal spot; a spot of the same form is sometimes found in the hindwing. Very often no trace of Smb.

Forewing : 14-15^{mm}; hindwing : 12,5-13^{mm}.

Coll. SELYS : not present. — Mus. Leyden : 3 ♀ Sumatra; 2 ♂, 6 ♀ Java (JACOBSON leg.). — Mus. Copenhagen : 1 ♀ Java, VIII, 1816 (coll. WESTERMANN). — Mus. Berlin : 1 ♂ Java. — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Java (JACOBSON leg.).

As to markings of the wings this species is liable to vary; but I think that the anal parts of the male and the strong yellowish sternits of 2nd to 5th abdominal segments will make the species easily recognizable.

[**N. hyalinata** Esben-Peters.].

Neopanorpa hyalinata ESBEN-PETERSEN, Notes Leyd. Mus., XXXV, p. 227, fig. 1 (1913).

Campodotecnium falcatum NAVÁS, Revue Russe d'Entom., XIII, p. 428, fig. 6 (1914).

Head shining black; rostrum reddish brown with yellowish lateral margins and with yellowish brown apex; maxillary palpi yellowish brown, tip of apical joint dark brown. Antennae blackish; the basal joints somewhat brownish. Thorax and abdomen dorsally shining metallic greenish black. Sides of thorax brown. The venter of 2nd to 5th abdominal segments yellowish brown to dark brown; venter of the terminal segments shining metallic greenish black. Legs brownish yellow; tip of tibiae and tarsal joints dark brown. Claws serrate. Hind margin of 3rd abdominal segment in the male produced into a somewhat raised prolongation, the basal half of which is flattened and broadly triangular, the apical half sub-cylindrical. The tip of the prolongation rests upon a transversely placed, keel-shaped elevation on the basal third of fourth segment. Sixth segment as long as fourth and fifth united, cylindrical, narrowed towards the apex. Seventh and eighth of the same length, each of them a little shorter than sixth, conical; eighth obliquely truncate at the apex above. Ninth segment broadly ovate. Upper appendage long with rounded apex. Tips of chelae dark brown. Wings hyaline with conspicuous, dark sooty brown pterostigma and with a faint indication of a sooty brown shadow at the tip of the wings. Below the inner end of the pterostigma is a minute, dark, sooty brown spot, connected with the pterostigma (not in the wings of the female). In the disc of the wings two small chitinous dots as in all Panorpid.

Forewing : 13-13,5^{mm}; hindwing : 11-12,5^{mm}.

Coll. SELYS : not present. — Mus. Leyden : 1 ♀ Nongkodjadar, Jan. 1911 (JACOBSON leg.) type). — Coll. ESBEN-PETERSEN : 1 ♂ Nongkodjadar, Jan. 1911 (JACOBSON leg.) (type). — Mus. Vienna : 1 ♂, 1 ♀ Java, 1891 (FRUHSTORFER leg.) (type-specimens of NAVÁS).

[**N. Mülleri** Weele].

Panorpa Mülleri WEELE, Notes Leyd. Mus., XXXI, p. 6 (1909). — WEELE, *ibid.*, XXXII, p. 199 (1910).

Panorpa Mülleri subsp. *ungaranensis* WEELE, *ibid.*, p. 7, fig. 2, pl. 1, fig. 2 (1909).

WEELE, *loc. cit.* :

« Very similar and nearly related to *P. angustipennis* WESTW., but differing from it in the following points :

The pterostigmatical fascia about half so narrow. The apical spot is considerably smaller and only narrowly connected with the pterostigma along the foreborder. In the hindwing it is nearly wholly separated from it. The distal prominence of it in *angustipennis* is only indicated by a right angle. The rest of the wing is hyaline.

Body, legs, etc. as in *angustipennis*.

The gonopoda of the ♂ differ in the following points : the ninth segment is broader and shorter, yellow, with a black forceps, the tips of which are crossed and more curved. The genital valves are black, yellow at the base, the apical parts are applied against one another and the tips are obtusely angulated.

Forewing : 14^{mm}; hindwing : 12,5^{mm}.

Habitat : Java. »

Coll. SELYS : not present.

[**N. lemniscata** Enderl.].

Campodotecnum lemniscatum ENDERLEIN, Notes Leyd. Mus., XXXIV, p. 236 (1912) (Java).

ENDERLEIN, *loc. cit.* :

« Kopf schwarz, Untergesicht dunkelbraun. Fühler schwarz, auch das erste Glied. Thorax schwarzbraun, Unterseite rostfarben. Abdomen glatt schwarz, auch die Unterseite, nur die Seitenlinie ein wenig rostfarben. Beine hell bräunlich gelb, 2.-5. Glied braun.

Flügel hyalin, in beiden Flügeln eine breite Querbinde am Ende des 2. Drittels dunkelbraun, von der Mitte geht eine schmale Gabelbinde nach aussen zum Hinterrand; Spitze nur kurz und wenig breit gesäumt. Eine Verbindung der beiden dunklen Zeichnungen am Vorderrand existiert nicht. »

Flügelänge : 11,5-12,5^{mm}.

Coll. SELYS : not present.

[**N. cingulata** Enderl.]

Campodotecnum cingulatum ENDERLEIN, Notes Leyd. Mus., XXXIV, p. 237 (1912) (Java).

ENDERLEIN, *loc. cit.* :

« ♀ Kopf schwarz, Untergesichtsverlängerung dunkelbraun. Fühler schwarz, das erste Glied blassgelblich. Thorax dunkelbraun, unten braun. Abdomen schwarz, oben blauschwarz, 6. und 7. Tergit gelbbraun; Unterseite gelblich. Beine braun, Schenkel braungelb, ebenso die Coxen.

Flügel hyalin mit bräunlich gelben Farbton. Am Ende des 2. Drittels auf beiden Flügeln eine schmale schräggestellte schwarzbraune Querbinde, die sich nach hinten verschmälert. Auf den Vorderflügel, ein wenig distal vom Ende des ersten Drittels, eine sehr schmale entgegengesetzt schräg gestellte Querbinde (so dass beide nach hinten zu convergieren). Flügelspitze und sonstige Stellen ohne Flecken. »

Flügelänge : 13^{mm}.

Formosan species.

[**N. Sauteri** Esben-Peters.] (plate II, fig. 13).

Panorpa Sauteri ESBEN-PETERSEN, Ent. Mitt., I, p. 197, fig. 1, 2 (1912). — MIYAKÉ, Journ. Coll. Agric. Imp. Univ. Tokyo, p. 346 (1913).

Head and rostrum yellowish brown; maxillary palpi yellowish brown, the apical joint with blackish tip. On the vertex an oblong brownish black median streak enclosing the ocelli. Antennae blackish; the two basal joints pale brown. Thorax yellowish or reddish brown with a black median stripe dorsally. Abdomen dorsally brownish black at the base, becoming yellowish brown towards the apex; the venter yellowish brown. Legs yellowish or testaceous; tip of tibiae and tarsal joints darker. Claws serrate. In the male the hind border of 3rd abdominal segment is produced into a slender cylindrical prolongation as long as 4th, 5th and 6th segments united. On the dorsum of 4th segment a tubercle. The 6th segment cylindrical, slightly narrowed towards the tip; 7th as long as sixth, much thinner, slightly incrassate towards the tip; 8th a little shorter, incrassate towards the tip, which is obliquely truncate above. Lower appendage short, somewhat pointed, strongly haired, their tips approximating. Wings slender with rounded tips and with strongly yellowish tinge; venation yellowish brown; markings sooty brown. Ab deeply incised in its inner margin; Ptb furcated in its posterior half; Smb in forewing furcated, and the apical branch connected with Bbr at the posterior margin. In the front margin of forewing is found a spot where R and Rs separate. At the hind margin of the hind wing a spot, nearly in the middle.

Forewing : 12-13^{mm}; hindwing : 10,5-12^{mm}.

Coll SELYS : not present. — Deutsches Ent. Mus. : 1 ♂ Koshun, Formosa, VIII, 1909 (SAUTER leg.) (type). — Mus. Leyden : 5 ♂, 5 ♀ Formosa, 1909 (SAUTER leg.) — Mus. Berlin 1 ♂ Chip-Chip, 1909 (SAUTER leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Kankau (SAUTER leg.).

[*N. formosana* Navás] (fig. 81).

Campodotecnium formosanum NAVÁS, Revue Russe d'Ent., XI, p. 114, fig. 5a, b (1911).

Panorpa formosana MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 346 (1913).

♀ Head and rostrum brown; maxillary palpi brown, tip of apical joint black; vertex with a large pitchy brown median spot enclosing the ocelli. Antennae black, the two basal joints pitchy brown. Thorax dorsally blackish, ventrally testaceous. Abdomen dorsally and ventrally blackish; the three terminal segments reddish



FIG. 81. — *Neopanorpa formosana* ♀ type-specimen
(Coll. Navás).

brown. Legs testaceous; the tip of tarsal joints darker; 5th tarsal joint nearly black. Claws serrate. Wings hyaline with faint yellowish tinge, brownish black nervures and sooty brown markings; wings proportionally broad, apex rounded. Ab (often enclosing one or two hyaline spots) narrowly connected with Ptb along the front margin; Ptb forked in its posterior part, Bbr broader than Abr; Msp oblong; Smb separated in two spots; Bsp (only present in the forewing) very small.

Forewing : 15-16^{mm}; hindwing : 14-15^{mm}.

Coll. SELYS : not present. — Coll. NAVÁS : 1 ♀ Tainan, Formosa (type). — Mus. Berlin : 1 ♀ Toyen-mongai near Tainan, 1 ♀ Taihorin, V, 1910.

I have not seen the male, and therefore I quote the description of NAVÁS : « Abdomen in ♂ processu dorsali 3-i segmenti arcuato, lumen inter ejus basim et gibbam 4-i liberante, usque ad $\frac{3}{4}$ hujus segmenti pertingente; 4-o toto medio apicali dorso gibboso; 5-o brevo, 6-o conico, praecedente duplo saltem longiore, apicem versus sensim angustato; 7-o praecedente plus quam dimidio brevior, apice dilatato; 8-o praecedente vix longiore, apice dilatato et oblique truncato; 9-o oblongo, inflato, testaceo-rufo, forcipe forti, dentibus seu chelis interne sinuatis; furca longa, petiolo longo, marginibus lateralibus concavis, brachiis lanceolatis, fuscis, apice subobtusis, basi inter se spatium triangulare relinquentibus. »

[*N. ophthalmica* Navás] (fig. 82, 83).

Campodotecnium ophthalmicum NAVÁS, Revue Russe d'Ent., XI, p. 113, fig. 4a, b, c (1911). —

ESBEN-PETERSEN, Ent. Mitt., II, p. 265 (1913).

Parnorpa ophthalmica MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 344 (1913).

Head pitchy brown; rostrum yellowish brown. Antennae blackish; the two basal joints yellowish brown. Prothorax and front part of mesothorax, pitchy black above. Metathorax and hind part of mesothorax yellowish brown or brown with a broad black median streak. 2nd to 6th abdominal segments blackish brown above, yellowish or reddish brown below; the terminal segments reddish brown; 6th segment in the male

blackish brown below. In the male the hind border of 3rd segment above produced in a slender, cylindrical prolongation, which reaches the two thirds of next segment. 4th segment with a tubercle on its dorsum. 6th segment cylindrical, slightly narrowed towards the apex; 7th and 8th of same length, a little shorter than

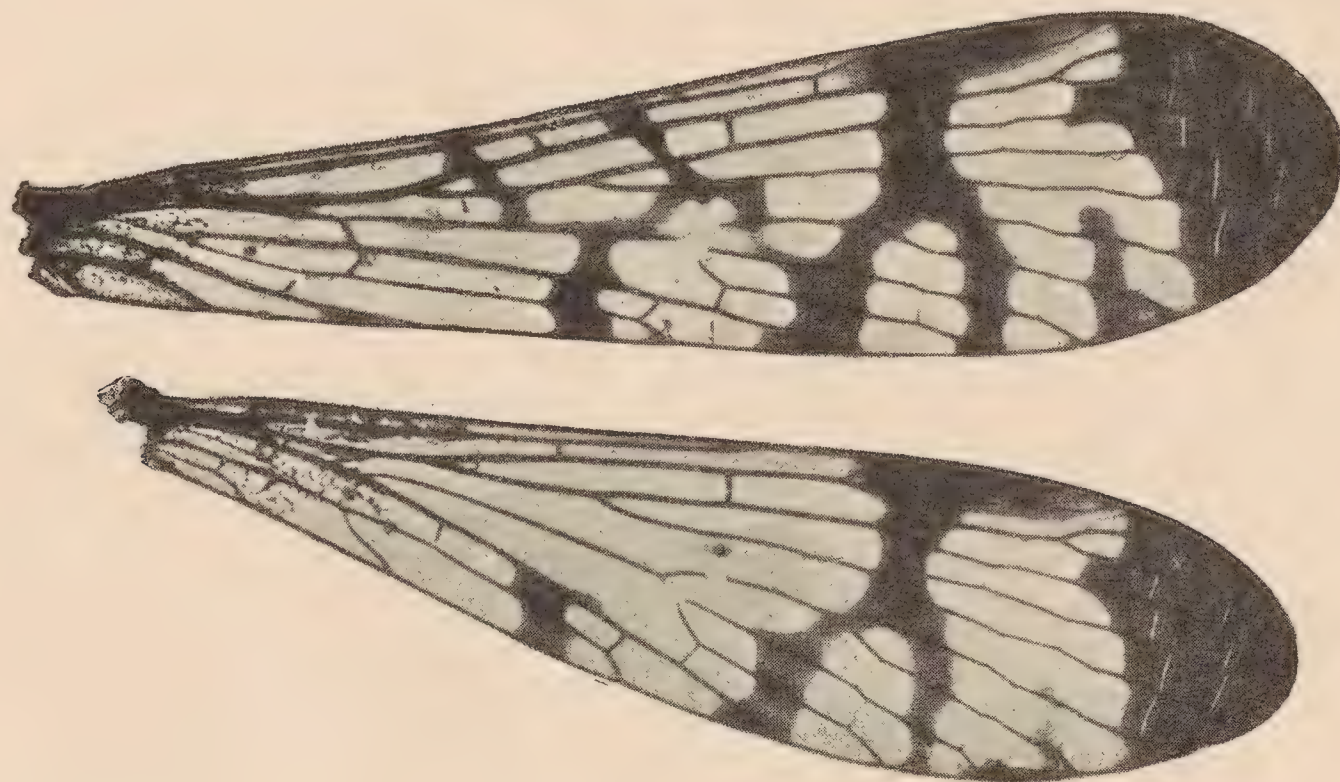


FIG. 82. — *Neopanorpa ophthalmica*
(Coll. Esben-Petersen).

6th, slightly incrassate towards apex. Branches of lower appendage wide apart at base; their apical parts overlapping each other. Wings slender with elliptical apex, with strong yellowish tinge, dark brown longitudinal veins and sooty brown markings. Ab broad with several hyaline spots, narrowly connected with Ptb

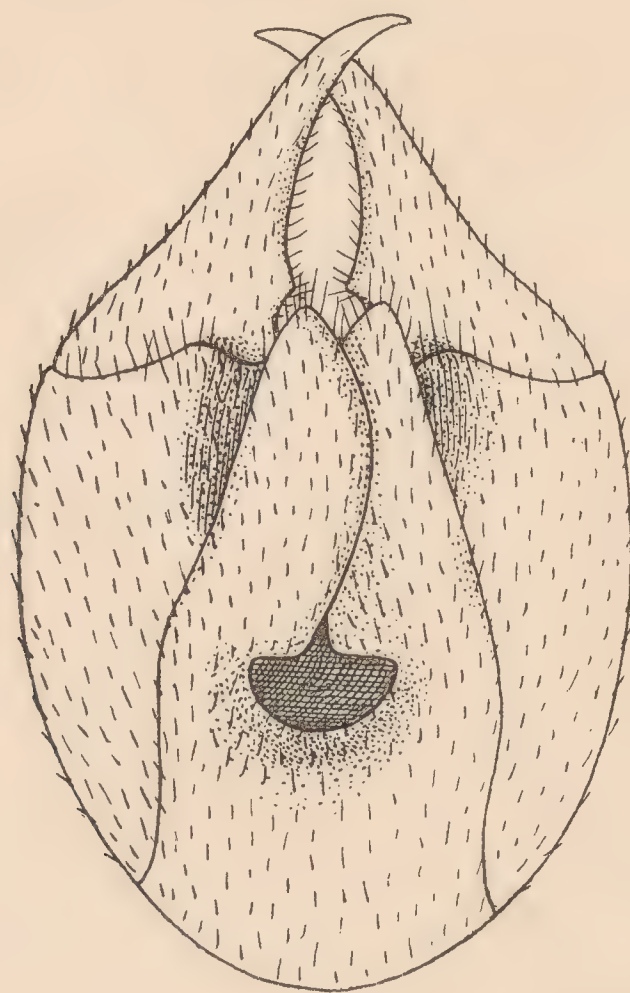


Fig. 83. — *Neopanorpa ophthalmica* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

along the front margin; the latter forked in its posterior part; Msp long, narrow and (in forewing) sometimes connected with Smb, which (in forewing) sometimes is complete, sometimes split up in two spots. Bsp very small, only present in forewing. In hindwing Smb only indicated by a spot at the hind margin.

Forewing : 14^{mm}; hindwing : 13^{mm}.

Coll. SELYS : not present. — Coll. NAVÁS : 1 ♂, 1 ♀ Tainan, Formosa (types). — Mus. Berlin : 2 ♂, 1 ♀ Tainan; 7 ♂, 3 ♀ Taihorin, Formosa. — Deutsches Ent. Mus. : 5 ♂, 11 ♀ Formosa (SAUTER leg.). — Coll. ESBEN-PETERSEN : 3 ♂, 3 ♀ Formosa (SAUTER leg.).

Continental species.

[*Neopanorpa cornuta* Esben-Peters.] (fig. 84, 85, 86).

Neopanorpa cornuta ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 227 (1915).

Head black; the insertion of antennae yellowish brown; rostrum yellowish brown; maxillary palpi yellowish brown, tip of apical joint black. Basal joint of antennae yellowish; the remainder of the antennae



FIG. 84. — *Neopanorpa cornuta* ♂ type-specimen
(Museum London.)



FIG. 85. — *Neopanorpa cornuta* ♂ type-specimen
Lateral view of abdominal segments
(Museum London).

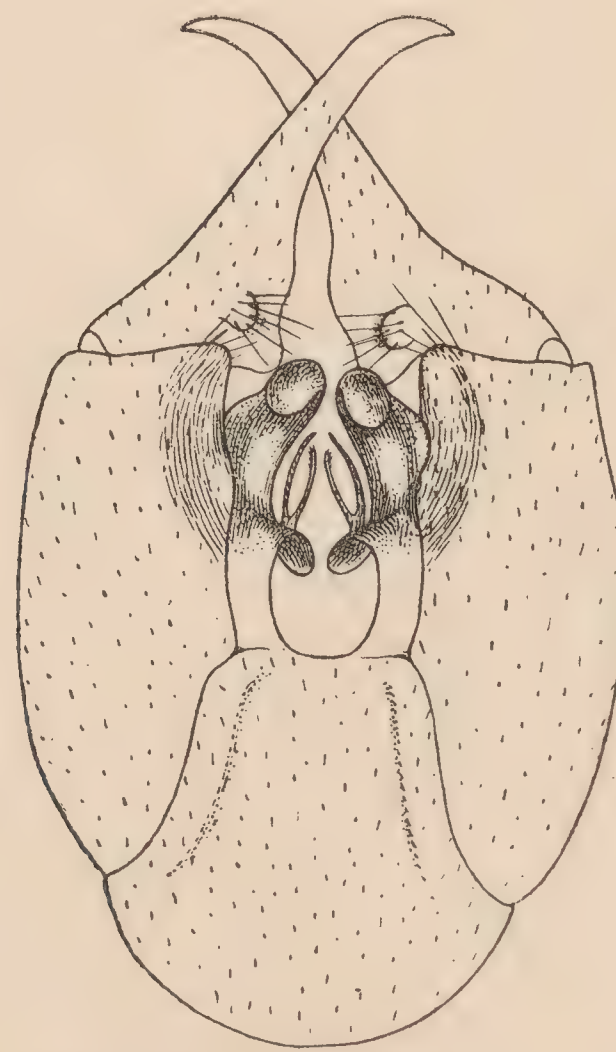


FIG. 86. — *Neopanorpa cornuta* ♂ type-specimen
Ventral view of terminal segment
(Museum London).

brown becoming dark brown towards apex. Prothorax black above; front half of mesothorax dark brown, hind part yellowish; metathorax yellowish with a semicircular dark brown spot at the front margin. Sides of thorax yellowish or testaceous with a few minute black dots. Legs yellowish; apex of tarsal joints dark. Claws serrate; teeth not of the same size. In the male the abdomen castaneous above; the venter, the three terminal segments and the apical half of the 6th yellowish brown. Hind margin of 3rd segment produced in the middle above into a long, slender, cylindrical prolongation, a little longer than next segment. Hind margin of

5th segment with two tubercles above. Near the hind margin of 6th segment two strong, raised, cylindrical, obtuse and somewhat divergent yellowish horns, blackish at tip; below the horns a small tubercle placed in the middle of the side margin. 7th and 8th segments of the same length, somewhat conical with the apex obliquely truncate above. Lower appendage of 9th segment of peculiar shape. In the middle of the inner margin a broad flap, bent down; tip rounded, bent upwards. Upper appendage with truncate apex; setae very long. Titillators deeply cleft; the branches narrow, linear and pointed. In the female the abdomen is castaneous dorsally, the venter yellowish; the three terminal segments reddish brown; setae black. Wings narrow at base, gradually broadened towards apex, which is broadly rounded. Membrane with a faint yellowish tinge; venation pale brown; cross veins in the apical part whitish; markings pale sooty brown. Smb as a rule complete in forewing, narrow; Msp in the forewing (absent in hindwing) extending so far that it touches the hind part of Ptb, which is forked in its lower half; Ab broad, in front connected with Ptb; in the middle of its inner margin with an obtuse prolongation.

Forewing 12,5-15^{mm}; hindwing 11,5-13,5^{mm}.

Coll. SELYS : not present. — Mus. London : 7 ♂, 9 ♀ North Khasia Hills, Assam (CAMERON leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ from the same locality.

[**N. zebrata** Esben-Peters.] (fig. 87).

Neopanorpa zebrata ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 228 (1915).

Head and rostrum yellowish brown; on vertex a small blackish spot, enclosing the ocelli. Rostrum long and slender; maxillary palpi yellowish brown; apex of apical joint blackish. Antennae blackish; 1st and 2nd joints yellowish. Thorax pale brown above and on the sides. Abdomen blackish brown dorsally, brown

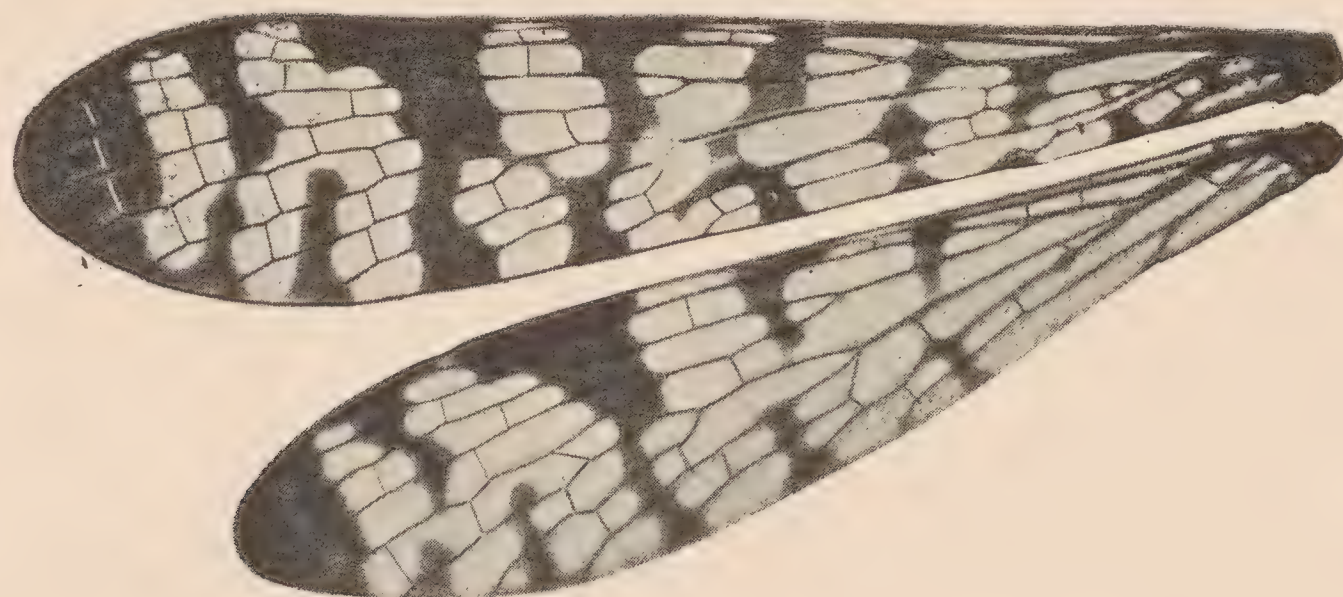


FIG. 87. — *Neopanorpa zebrata* ♀ type-specimen (Museum London).

ventrally; the apical segment brown; setae blackish. Legs yellowish; tip of tarsal joints brown. Claws serrate. Wings hyaline, with hardly yellowish tinge, narrow and long, gradually broadened towards the apex, which is elliptical. Longitudinal veins dark brown; cross veins in the apical part very pale, nearly whitish. Markings sooty brown, in form of irregular cross bands, connected in the middle of the wing.

Forewing : 13^{mm}; hindwing : 12^{mm}.

Coll. SELYS : not present. — Mus. London : 1 ♀ Travancore, India (HAMPSON leg.).

[**N. appendiculata** Westw.] (fig. 88).

Panorpa appendiculata WESTWOOD, Trans. Ent. Soc. London, IV, p. 186 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 460 (1853) (Madras).

♀. Head yellowish brown; on vertex a small black spot enclosing the ocelli. Rostrum shining castaneous, paler at the margins and with blackish apex. Antennae black; 1st and 2nd joints brown at base. Prothorax yellowish brown above; meso- and metathorax greyish brown above. Abdomen black above

blackish brown towards apex. Sides of thorax testaceous, venter of abdomen brownish. Legs brownish. Claws

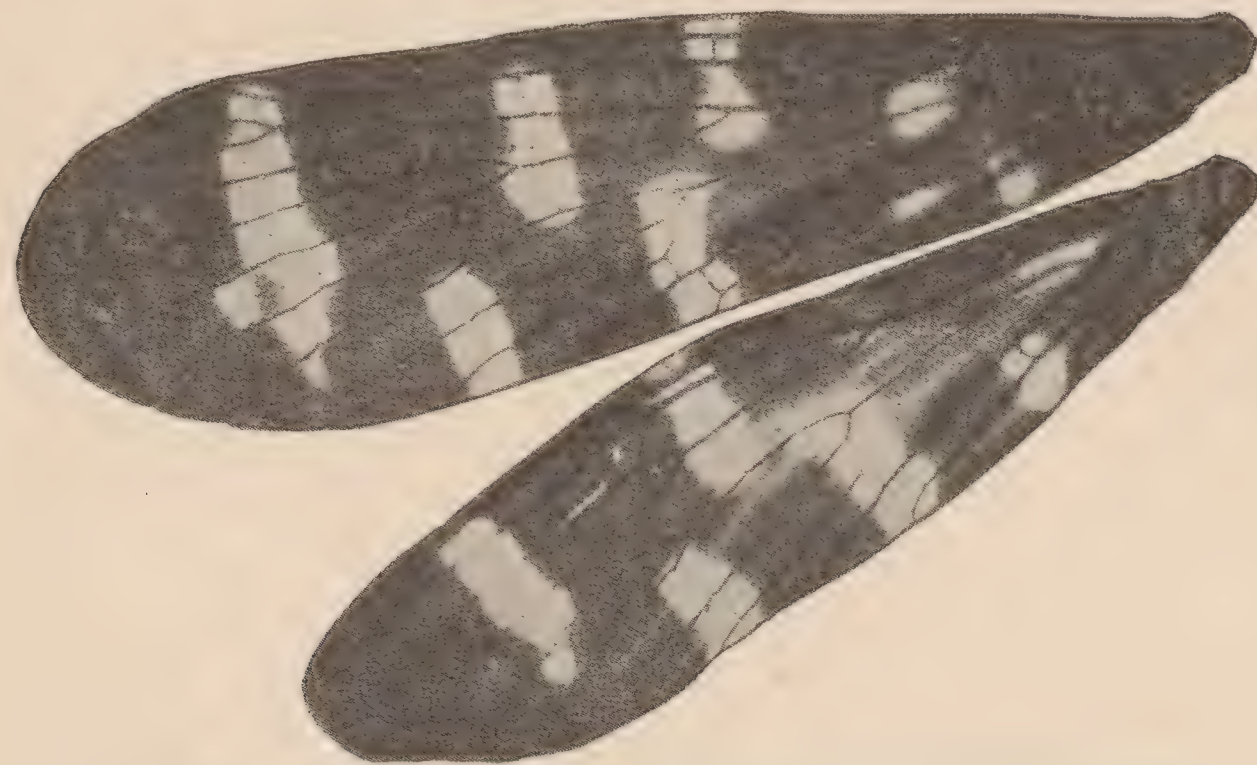


FIG. 88. — *Neopanorpa appendiculata* ♀ type-specimen
(Museum London).

serrate. Cerci black. Wings broad with rounded apex, sooty black with 5 whitish irregular fasciae. Longitudinal veins darker than the membrane; apical cross veins paler.

Forewing : 12^{mm}; hindwing 11^{mm}.

Coll. SELYS : not present. — Mus. London : 1 ♀ India (type).

I have not seen the male-type, which after the description of WESTWOOD has the hind margin of third segment produced into a slender prolongation as long as the breadth of the fourth.

[*N. flava* Esben-Peters.] (fig. 89).

Neopanorpa flava ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 229 (1915).



FIG. 89. — *Neopanorpa flava* ♀ type-specimen
(Museum Berlin).

♀. Vertex black; front and rostrum yellowish brown; maxillary palpi yellowish brown, apical joint darker at tip; antennae blackish brown (terminal part lost), the three basal joints yellowish brown. Prothorax black with narrow yellowish brown hind margin; mesothorax blackish in its front half above; metathorax black in its front third. Sides of thorax and legs yellowish brown. Claws serrate. The basal abdominal segments and the venter of whole of the abdomen yellowish red brownish. Setae long, with hairs, blackish towards apex. Wings long and slender with elliptical apex, and strongly reddish yellow tinge; venation a little more intensely coloured. Markings dark sooty brown. No Bsp; Smb indicated by two spots in forewing; a small one at Rs, near base, and a larger one on the hind margin; only the latter is present in the hindwing; Msp narrow; Ptb broadly furcated in its lower half; the tip of the band does not reach the anterior margin of the wing, but runs for a short distance in apical direction below pterostigma; the basal margin of Ab with a wedge-shaped prolongation, directed obliquely inwards.

Forewing : 19^{mm}; Hindwing : 17^{mm}.

Coll. SELYS : not present, — Mus. Berlin : 1 ♀ Sikhim, Septbr. 1885.

When the male comes under consideration, it will perhaps be necessary to transfer the species to the genus *Leptopanorpa*.

[**N. nipalica** Navás] (fig. 90, 91).

Panorpa nipalica NAVÁS, Deutsche Ent. Zeitsch., p. 288, fig. 1a, b (1910).

Aulops suffusa NAVÁS, Revue Russe d'Ent., p. 427, fig. 5 (1914).

Head black; rostrum with narrow yellow side margins. Antennae and thorax blackish brown. Abdomen black; 9th segment brown; chelae short and blackish at base. 3rd segment with a long cylindrical prolongation, almost as long as 4th segment. 6th segment cylindrical; 7th and 8th of the same length, as long as 6th, conical;

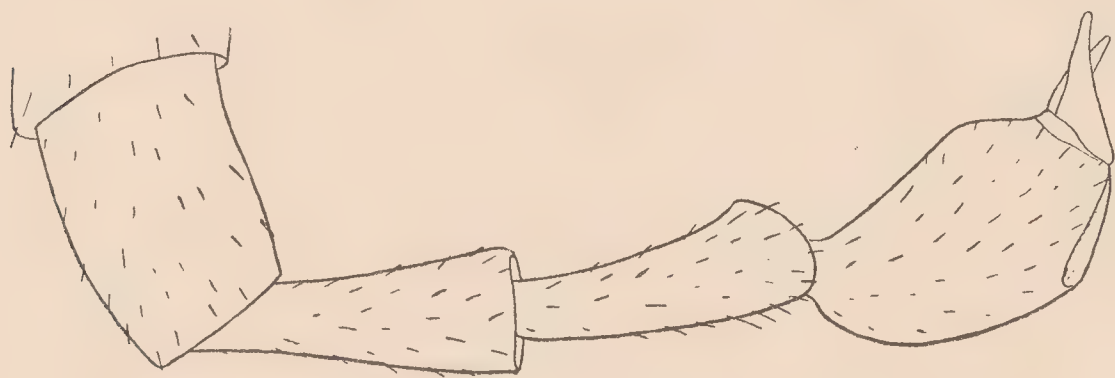


FIG. 90. — *Neopanorpa nipalica* ♂ type-specimen
Lateral view of abdominal segments
(Museum Paris).

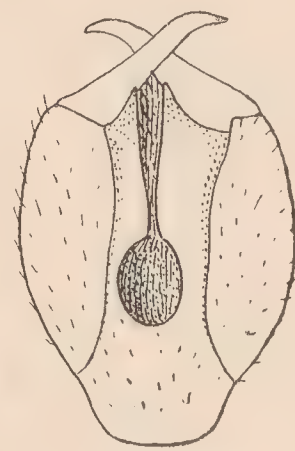


FIG. 91. — *Neopanorpa nipalica* ♂ type-specimen
Ventral view of terminal segment
(Museum Paris).

hind margin of 8th obliquely truncate above. Underside of thorax and of the basal abdominal segments yellow. Legs yellow; tibiae and tarsi darker; tip of tibiae and of tarsal joints narrowly blackish. Claws provided with denticles. Wings hyaline with a faint yellowish tinge and without spots and bands. All the veins brown; cross veins paler. Pterostigma yellowish brown. Sc in forewing joins the costa before the pterostigma.

Forewing : 13^{mm}; hindwing : 12^{mm}.

Coll. SELYS : not present. — Mus. Hamburg : 1 ♂ Sikkim. — Mus. Paris : 1 ♂ Sikkim, 1891 (HARMAND leg.) (type). — Mus. Vienna : 1 ♂ Sikkim (type of *A. suffusa*).

[**N. ocellaris** Navás] (fig. 92).

Panorpa ocellaris NAVÁS, Mem. Real Acad. Cienc. Barcelona, p. 417, fig. 22 (1908).

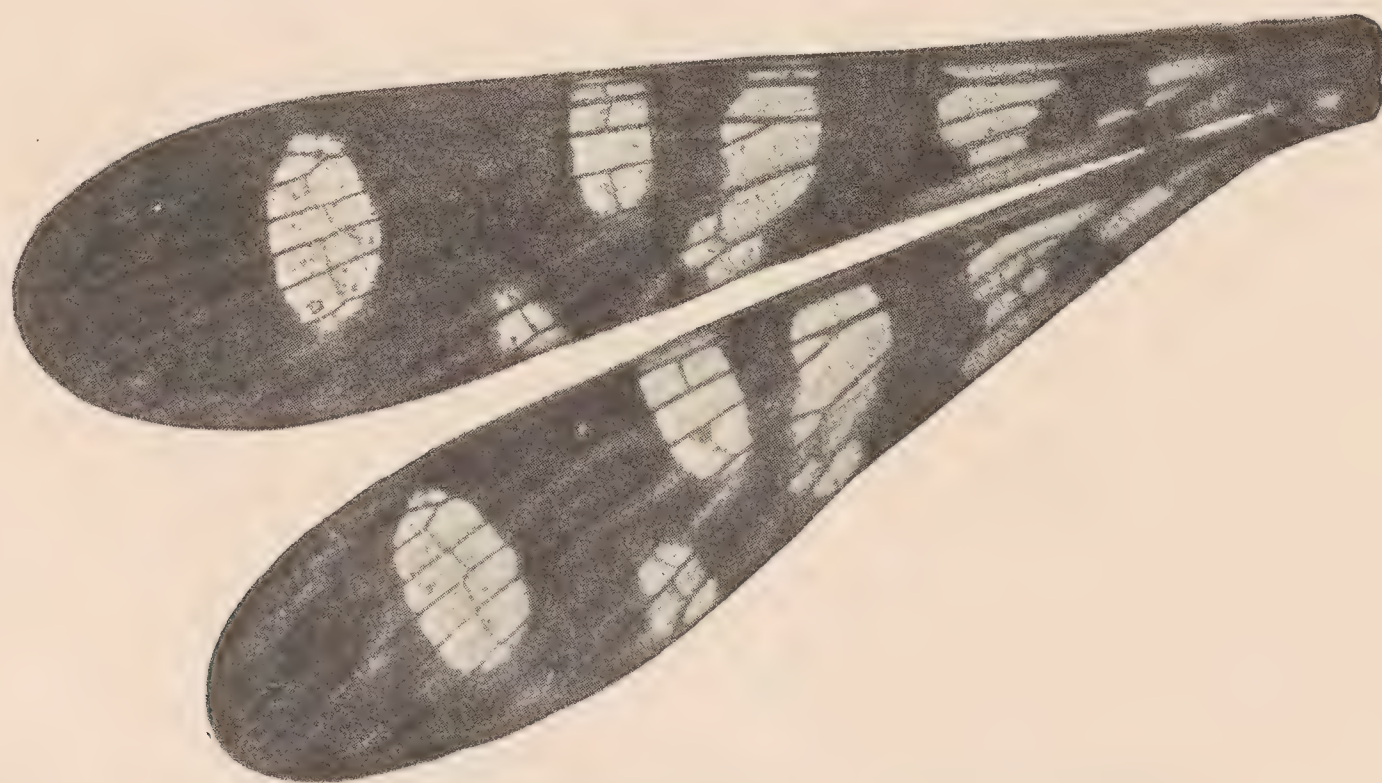


FIG. 92. — *Neopanorpa ocellaris* ♀ type-specimen
(Museum Paris).

Head, rostrum, thorax and abdomen jet black, glabrous; lateral margins of rostrum reddish brown, the three terminal joints reddish brown. Venter of thorax and abdomen pale greyish brown. Legs yellowish

brown, tarsi a little darker; coxae with a black longitudinal stripe exteriorly; tip of tibiae and of tarsal joints brown. Claws three-dentate interiorly; the apical dent small. Wings dark smoky brown with hyaline spot and bands. All the veins in the three apical spots yellowish; cross veins in the dark apical part of wings pale; the other veins darker than the membrane.

Forewing : 14^{mm}; hindwing : 13^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♀ Sikkim (HARMAND leg.) (type).

[**N. Cavaleriei** Navás] (fig. 93, 94).

Panorpa Cavaleriei NAVÁS, Mem. Real Acad. Scienc. Barcelona, p. 417, fig. 23 (1908).



FIG. 93. — *Neopanorpa Cavaleriei* ♂ type-specimen
(Museum Paris).

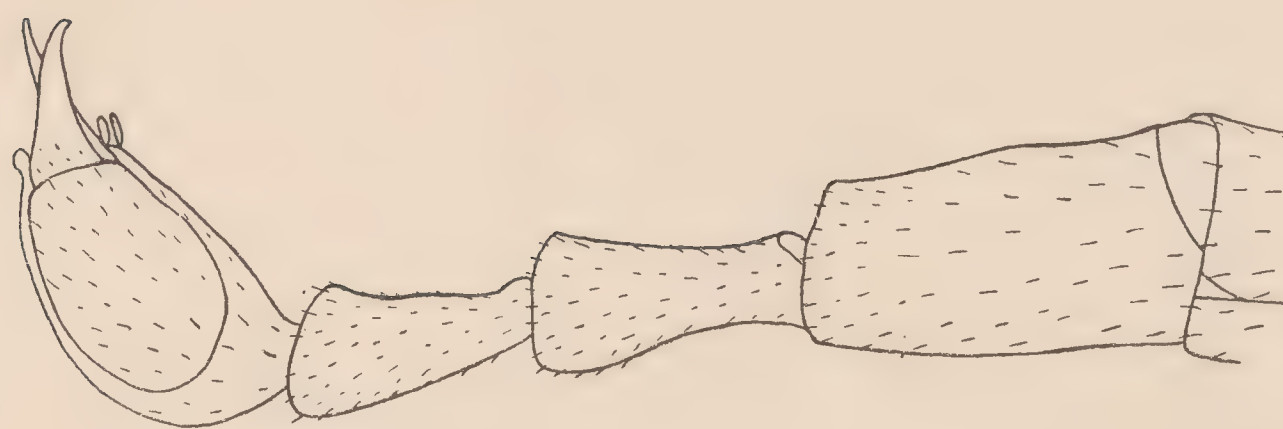


FIG. 94. — *Neopanorpa Cavaleriei* ♂ type-specimen
Lateral view of abdominal segments
(Museum Paris).

Head castaneous, rostrum reddish brown; maxillary palpi yellowish brown. Antennae as long as the wings; the two basal joints reddish brown; the remainder of antennae blackish brown at base, greyish brown towards the tip. Thorax reddish brown dorsally; sides yellowish brown with some small linear black spots. Abdomen reddish brown. The prolongation of the posterior border of third segment narrow and long, almost as long as fourth segment. 6th segment cylindrical, a little narrowed towards apex; 7th segment one fourth shorter than 6th, a little incrassate towards apex; 8th as long as 7th, thickened towards apex, which is obliquely truncate above. Legs testaceous; tip of tibiae and tarsal joints blackish brown. Claws serrate internally. Wings slender, elliptical at tip, hyaline with a faint yellowish tinge. Longitudinal veins and basal cross veins reddish brown; the apical cross veins not very distinct. Btb pale smoky brown, forked posteriorly, connected along the anterior margin with Ab, which has an oblique prolongation in the middle (especially in the forewing). Before Ptb an indication of 2 or 3 small spots.

Forewing : 16^{mm}; hindwing : 14,5^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♂ Kouy Tscheü, Kouy Yang, 1906 (CAVALERIE leg.) (type).

The type-specimen before me has the anal appendages covered with dirt, and therefore I cannot give drawings or descriptions of them. It seems that the upper appendage is rounded at tip. Setae very long. The

branches of lower appendage rather stout, the interior margins running close together, but forming a circular hole at their base.

[**N. Harmandi** Navás] (fig. 95).

Panorpa Harmandi NAVÁS, Mem. Real Acad. Cienc. Barcelona, p. 416, fig. 21 (1908).

Head and rostrum ferrugineous; tip of rostrum black. A black spot between the ocelli; on vertex a black spot produced laterally towards the eyes. Antennae brownish black, first, second and two thirds of third joint yellowish brown. Thorax black dorsally; meso- and metathorax with a circular pale brown spot

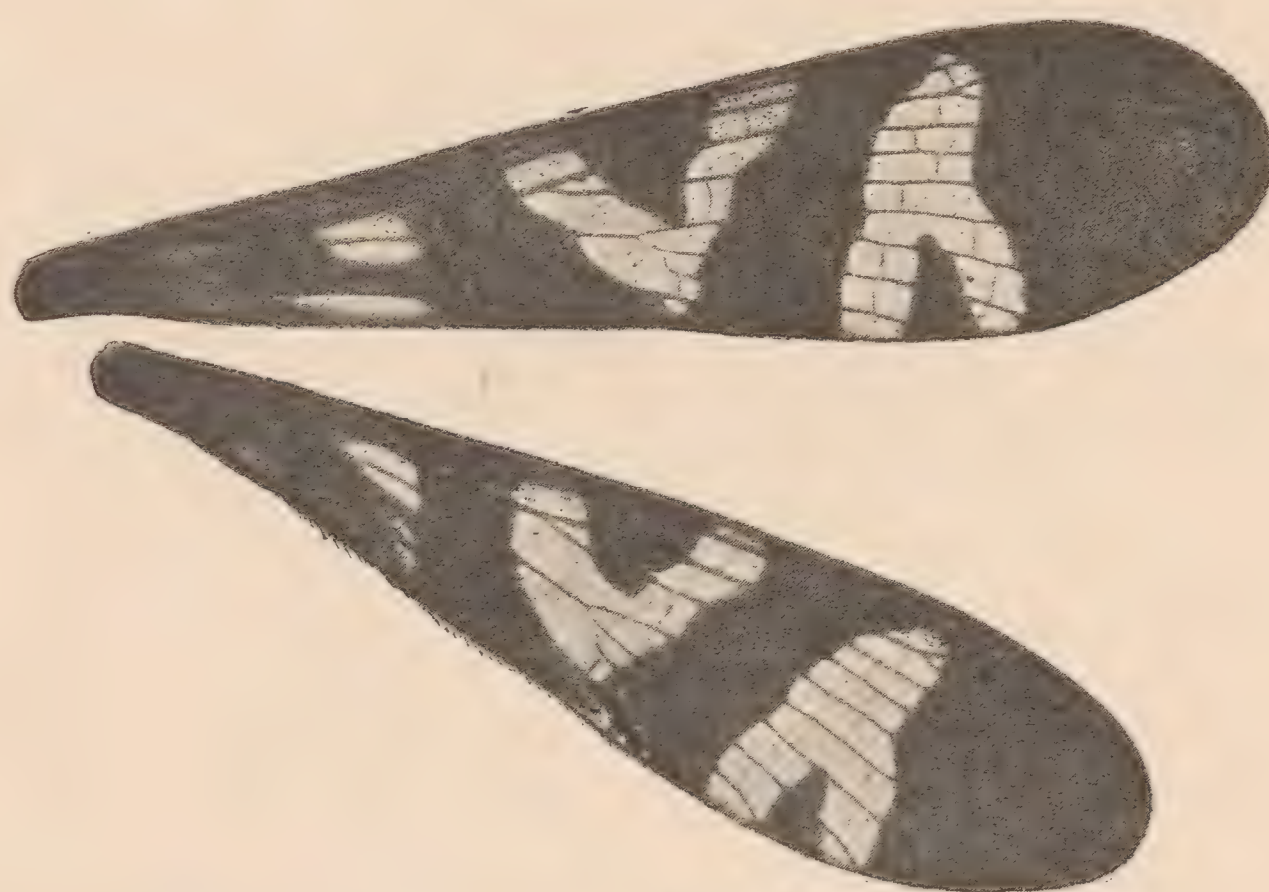


FIG. 95. — *Neopanorpa Harmandi* type-specimen (Museum Paris).

at the root of each wing. Venter and coxae brownish black. Legs yellowish brown; the hind pair darker; tip of tibiae and of tarsal joint narrowly brown. Claws three-dentate inferiorly. Wings dark smoky brown with hyaline spots and bands. Cross veins very indistinct.

Forewing : 12^{mm}; hindwing : 11^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 specimen (abdomen lost), Cochinchina (HARMAND leg.).

[**N. fenestrata** Needh.]

Panorpa fenestrata NEEDHAM, Rec. Ind. Mus., III, p. 195, pl. XXI, fig. 13-15 (1909).

NEEDHAM, *loc. cit.* :

« Upper Assam.

Length of body 15^{mm}. Antennae 11^{mm}. Rostrum 4^{mm}. Expanse of wings 28^{mm}. Colour black, paler beneath and rufescent on the basal segment of the antennae, on the hind angles of all the thoracic segments and on the sides of the rostrum. The last three abdominal segments of the male, wholly rufous.

Wings bicoloured, the basal half mainly hyaline; with two diffuse basal spots on the fore wings only, and just before the middle with a broad, transverse bar, broadly bifurcated in front. the arms of the fork surrounding a round hyaline spot on the costa. Apical half of the wings brown, inclosing a large transverse oval hyaline spot behind the stigma, and a smaller more proximal spot on the hind margin. The subcostal vein is confluent with the costal far before the stigma, and the upper division of the radial sector is three times forked. The abdominal appendages are as shown in pl. XXI, figs. 13-15. »

Coll. SELYS : not present.

[*N. sordida* Needh.]

Panorpa sordida NEEDHAM, Rec. Ind. Mus., III, p. 196, pl. XXI, fig. 16, 17 (1909).

NEEDHAM, *loc. cit.* :

« One male and two females, 64, 65 and 66, Pusa collection, from Khasi Hills, Assam (May) c. 5,000 ft., in wooded spots.

A pale brownish species with smoky hyaline, nearly concolorous wings.

Length, male 11^{mm}; female 10^{mm}. Antennae of female 10^{mm}. Expanse of wings 22^{mm}.

Pale fuscous, the second and third thoracic segments fulvous, diffusely phalerate with blackish on all sutures. Base of antennae tawny yellow. Legs of the same colour, the tips of the femora, tibiae and tarsi brownish. Terminal segments of the abdomen in the male, tawny.

Wings smoky hyaline with brown veins, unmarked in the male and in one female, in the other female showing two brownish bands; the first a diffuse crossband just beyond the middle of the wing, bifurcated and obsolescent behind, and an oblique apical spot beyond the stigma extending but a little upon the hind margin beyond the apex. The subcostal vein joins the costa at the level of the stigma, and the anterior division of the radial sector is twice forked. The abdominal appendages of the male are as shown in pl. XXI, figs. 16, 17. »

Coll. SELYS : not present.

Genus *LEPTOPANORPA* Mac Lachl.

MAC LACHLAN, Trans. Ent. Soc. London, p. 187 (1875). — WEELE, Notes Leyd. Mus., XXXI, p. 11 (1909). — ENDERLEIN, Zool. Anz., XXXV, p. 393 (1910). — ESBEN-PETERSEN, Notes Leyd. Mus., XXXV, p. 228 (1913). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 381 (1913).

Himanturella ENDERLEIN, Zool. Anz., XXXV, p. 392 (1910).

Neopanorpa ENDERLEIN, Notes Leyd. Mus., XXXIV, p. 237 (1912) (nec WEELE).

Rostrum long and slender. Claws serrate internally. Abdomen very long and slender in the male, much longer than the wings. 6th, 7th and 8th segment modified, much prolonged; 9th segment sometimes pedunculate. Hind border of 3rd abdominal segment in the male produced into a slender prolongation. Subcosta joins the costa in the pterostigmatal region. 1A joins the hind margin far before the origin of radial sector. Between 1A and 2A one cross vein. R2a is often forked close to the margin of the wing. Wings more and less marked with bands and spots, slender and narrow, especially on the base. In the male the lower appendage is broad; its branches broad, stout, as a rule overlapping each other and covering the titillators.

Habitat : Japan, South and East Asia, Insulinde.

[*L. Ritsemai* Mac Lachl.]

Leptopanorpa Ritsemae MAC LACHLAN, Trans. Ent. Soc. London, p. 187 (1875) (Japan). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 381 (1913).

MAC LACHLAN, *loc. cit.* :

« Testaceous, the head blackish (excepting posteriorly) and with a black median line along the thorax (in the ♀ the head and thorax are nearly wholly blackish above). Legs yellowish; wings with a slight testaceous tinge, and with fuscous veins; there is a very narrow pale fuscous fascia beyond the middle, expanding on the costa, where it forms the inner side of the pterostigma (in the posterior wings this fascia is abbreviated or interrupted), and (in the ♀) two or three small basal spots; posterior edge of the 5th abdominal segment in the ♂ blackish; terminal segments yellowish; 6th and 7th segments each nearly as long as all the basal segments united; the apical portion gradually incrassate; footstalk of the cheliferous segment scarcely shorter

and of the same form; its apex considerably dilated, so that the basal portion (before the claws) is somewhat pyriform; claws long, strongly curved and crossing; appendages very long and slender, extending beyond the base of the claws. (In the ♀ the terminal segments of the abdomen are very slender). — Total length of body of ♂ about 25^{mm}; expanse 25^{mm}. »

Coll. SELYS : not present.

[**L. Sieboldi** Mac Lachl.]

Leptopanorpa Sieboldi MAC LACHLAN, Trans. Ent. Soc. London, p. 188 (1875) (Japan). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 381 (1913).

MAC LACHLAN, *loc. cit.* :

« Head deep black, pale posteriorly; rostrum piceous, with pale sides. Thorax piceous in front, testaceous posteriorly, wholly yellow beneath. Abdomen fuscous. Legs yellow. Wings with a slight greyish tinge, and with fuscous veins; the marking is a rather broad pale fuliginous apical space, straight internally (♀). — Expanse 24^{mm}. »

Coll. SELYS : not present.

[**L. furcata** Hardw.] (fig. 96).

Panorpa furcata HARDWICKE, Trans. Linn. Soc. London, XIV, p. 132, pl. 5, fig. 2-6 (1825). — KLUG, Abh. Königl. Akad. Wiss. Berl., p. 107 (1836). — WESTWOOD, Trans. Ent. Soc. London, IV, p. 186 (1844). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 461 (1853).

♀. Head and rostrum yellowish brown; a large black spot on vertex, touching the eyes. Maxillary palpi yellowish brown; apical joint darker at the tip. Rostrum very long and slender. Antennae brownish

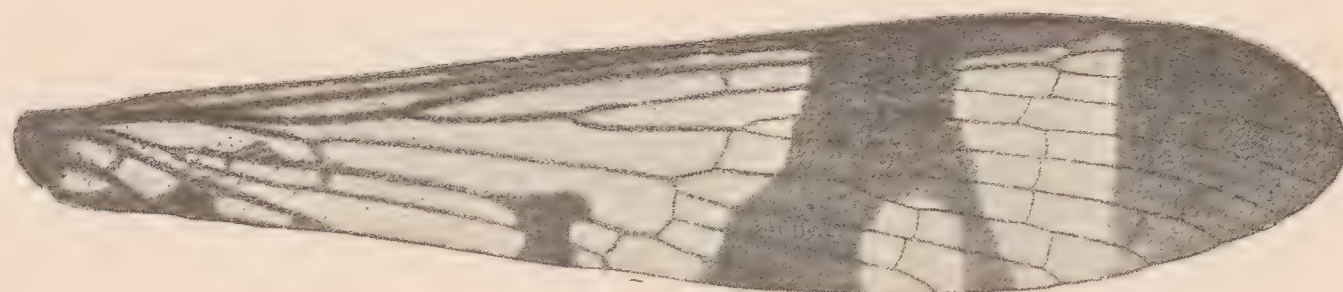


FIG. 96. — *Leptopanorpa furcata* ♀ type-specimen
Right forewing
(Museum London).

black; basal joint yellowish brown, stout; second joint brown; third joint brown basally. Prothorax black above with narrow yellowish brown hind margin; mesothorax black above; metathorax greyish brown. Abdomen brownish black above, reddish brown ventrally; terminal segments and setae reddish brown. Legs brownish yellow; tip of tarsal joints darker. Claws serrate. Wings elongated with elliptical apex and with a strongly yellowish tinge. Subcosta and apical half of radius yellowish; the remainder of longitudinal veins brownish black; cross veins paler (especially in the apical part). Markings sooty brown. At the base of forewing the ordinary Bsp together with a longitudinal one along the hind margin; near the front margin two minute round spots, one of them in the fork between radius and subradius, the other between subradius and first radial sector. In both pair of wings a spot in the middle of the hind margin; Ptb very broad and forked in its lower part; Bbr nearly as broad as the band, Abr very narrow; Ab very broad and with straight inner margins.

Forewing : 19^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♀ Nepal (type).

I have not seen the male of this species, but below I give some notes taken from the drawings and description of HARDWICKE : Hind margins of 3rd abdominal segment produced above into a prolongation as long as the following segment. 6th cylindrical, the apex above produced into two erected prolongations. 7th and 8th very slender, a little broadened at apex; each of them as long as 5th and 6th together. 9th stalked; the apical joint of chelae very long and slender.

[*L. Charpentieri* Burm.] (fig. 97, 98, 99).

Panorpa Charpentieri BURMEISTER, Handb. Ent., II, p. 958 (1839). — WESTWOOD, Trans. Ent. Soc. London, IV, p. 187 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 461 (1853). — WEELE, Notes Leyd. Mus., XXXI, p. 13 (1909).

Panorpa nematogaster MAC LACHLAN, Trans. Ent. Soc. London, p. 69 (1869). — ID., Ibid., p. 188 (1845). — WEELE, Notes Leyd. Mus., XXXI, p. 9, fig. 4 (1909). — Ibid., XXXII, p. 200 (1910).

Himanturella nematogaster ENDERLEIN, Zool. Anz., XXXV, p. 392 (1910).

Neopanorpa nematogaster ENDERLEIN, Notes Leyd. Mus., XXXIV, p. 237 (1912).

Neoparnopa linguata NAVÁS, Revue Russe d'Ent., p. 430, fig. 8a, b, c (1914).

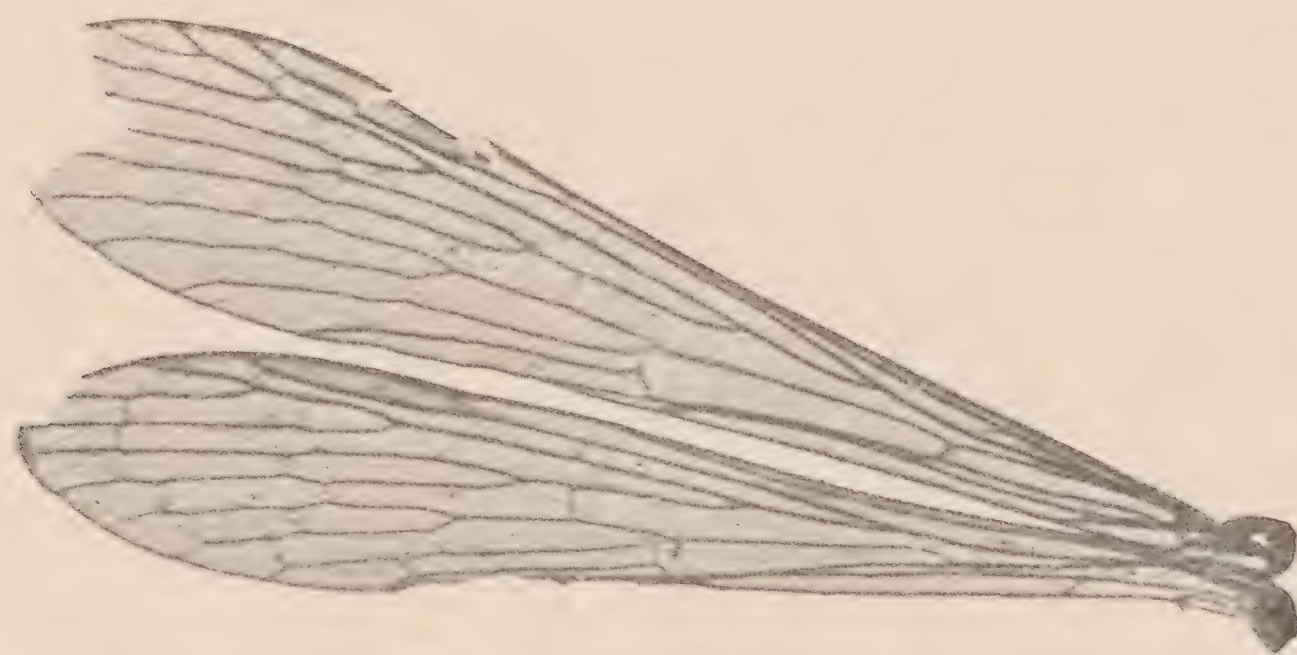


FIG. 97. — *Leptopanorpa Charpentieri* ♂ type-specimen (Museum Halle).

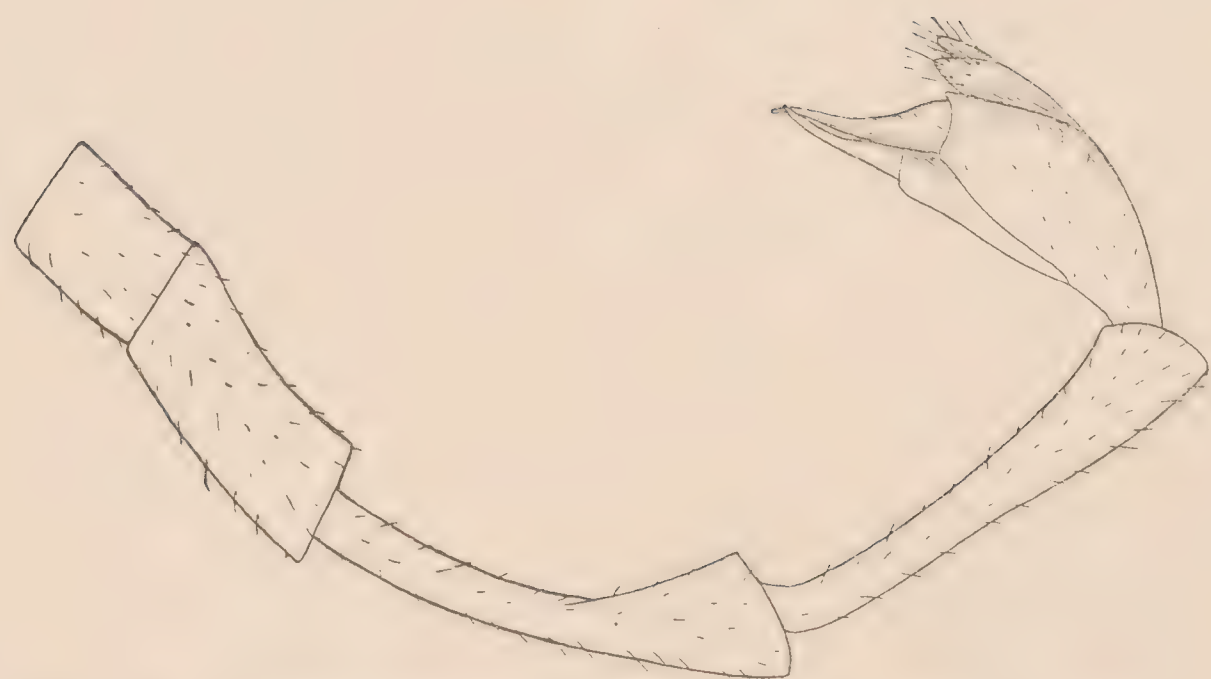


FIG. 98. — *Leptopanorpa Charpentieri* ♂ type-specimen
Lateral view of abdominal segments
(Museum Halle).



FIG. 99. — *Leptopanorpa Charpentieri* ♂ type-specimen
Ventral view of terminal segment
(Museum Halle).

Head black; rostrum castaneous, pale brown at the sides; maxillary palpi testaceous; the apical joint blackish at the tip. Antennae blackish; 2nd joint brown at the tip. Prothorax black with reddish brown hind margin; meso- and metathorax reddish brown, blackish in front. The sides of thorax yellowish brown. Abdomen brownish black, in fully matured specimens totally black. Legs testaceous; tips of tarsal joints darker. Claws serrate internally; the dent in the middle longest. Wings long and slender, shining pale yellowish testaceous and without markings. Pterostigma slightly yellowish. Venation blackish brown. Abdomen in the male very slender. Third abdominal segment produced in the middle of its hind margin above

into a long slender curved process; slightly dilated at the apex. Fourth segment with a small tubercle in the middle above.

Type-specimens of BURMEISTER : Forewing : 12-12,5^{mm}; hindwing : 11-11,5^{mm}.

Type-specimen of MAC LACHLAN : Forewing : 15^{mm}; hindwing : 14^{mm}.

Type-specimens of NAVÁS : Forewing : 13,5-15^{mm}; hindwing : 12-14^{mm}.

Body ♂ 30^{mm}; ♀ 15,5^{mm}.

Coll. SELYS : not present. — Mus. Halle : 1 ♂, 1 ♀ (without indication of locality) (types of BURMEISTER). — Brit. Mus. : 1 ♀, Java (WALLACE leg.) (type of MAC LACHLAN). — Mus. Vienna : 1 ♂, 1 ♀, Sumatra, 1875 (PLASON leg.) (types of NAVÁS).

The type-specimens of BURMEISTER are somewhat immature and smaller of size than the female from Brit. Mus.

When MAC LACHLAN states that the tarsal claws only have two claws internally, it is, I think, due to the fact that he has not examined the claws under the microscope.

The « puncto singulo fusco in cellula una media » mentioned by BURMEISTER is one of the chitinous dots commonly found in wings of Panorpids.

BURMEISTER on page 957 in his « Handbuch » says that he will describe a new species from Bengal; but in his description he only gives the vague locality « Ostindien ». The only true localities known to me is Java and Sumatra, so I think the occurrence of the species in Bengal to be rather doubtful.

[**L. longicauda** Weele] (plate II, fig. 16).

Leptopanorpa longicauda WEELE, Notes Leyd. Mus., XXXI, p. 11, fig. 7, fig. 8, pl. 1, fig. 5 (1909). — Ibid., XXXII, p. 200 (1910). — ESBEN-PETERSEN, Notes Leyd. Mus., XXXV, p. 228 (1913).

Head, rostrum, thorax and 2nd to 6th abdominal segments yellowish red; the terminal segments more yellowish. Maxillary palpi yellowish red; apex of terminal joint darker. Each of the ocelli surrounded by a black circle; the two hindmost connected by a black streak. Antennae blackish; 1st, 2nd and base of 3rd joints reddish yellow. On each side of the thorax two small black dots. Legs yellowish red; tip of tibiae and tarsal joints brownish black. In the male the hind border of 3rd abdominal segment produced into a slender cylindrical prolongation, reaching the middle of 4th segment. The tergite of this segment has a very slight elevation in the middle. On the hind border of 3rd segment, also of 6th, 7th and 8th, a shining black streak on each side. 6th segment cylindrical, nearly as long as 3rd, 4th and 5th together. 7th and 8th of the same length, each of them as long as 4th, 5th and 6th together, conical at their tips. 9th longly pedunculate. Branches of lower appendage stout, upper appendage somewhat pointed at the tip; chelae long, slender and somewhat curved. Wings long and slender with elliptical tip, with strong reddish yellow tinge, yellowish brown venation and conspicuous, sanguineous pterostigma. No markings on the wings.

Length of body (♂) 40^{mm}; forewing : 17^{mm}; hindwing : 15,5^{mm}.

Coll. SELYS : not present. — Mus. Leyden : 1 ♂ Java (MÜLLER leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Goenseng, Java (JACOBSON leg.).

It is a fine and very distinct species. A single female is found on Mount Malabar, Java, by WEELE who says that the forewing is 14^{mm}, the hindwing 12^{mm}. The type specimen of WEELE in the Mus. of Leyden measures : Body 32^{mm}; forewing 14^{mm}; hindwing 12^{mm}.

[**L. tubifera** Enderl.]

Himanturella tubifera ENDERLEIN, Zool. Anz., XXXV, p. 392 (1910) (Java).

ENDERLEIN, loc. cit. :

« Kopflänge etwa 4^{mm}. Kopfverlängerung lang und dünn. Augen sehr gross. Kopf schwarz; Fühler dünn, fast von Flügellänge, dunkel rotbraun, Basalglied gelbbraun. Kopfverlängerung rostrot, ebenso der

Palpus, dessen Endglied in der Spitzenhälfte braun. Pronotum schwarz, rechteckig, doppelt so breit wie lang, vorn etwas eingedrückt, in der Mitte ein scharfer Quereindruck. Meso- und Metathorax gelbbraun, oben mit breitem Medianstreif, der die Antedorsa und Scutella beider Segmente ausfüllt. Beine sehr lang, gelbbraun, Coxen und Schenkel hell bräunlichgelb. Klauen mit mindestens fünf sehr kräftigen Zähnen (Endzahn mitgezählt). Abdomen hell bräunlich gelb, Oberseite der sechs ersten Segmente rostbraun, Basalhälfte des sechsten oben schwärzlich. 1. Tergit sehr kurz, quer, zweites so lang wie breit, drittes 1,5 mal so lang wie breit, der dünne stäbchenförmige, schwach nach unten gekrümmte Anhang (fast 1^{mm} lang) in der Mitte des Hinterrandes fast halb so lang wie das folgende Segment, nach hinten gerichtet und mit dem Ende auf einem Höcker etwa am Ende des ersten Drittels des 4. Tergits ruhend. 4. und 5. Tergit doppelt so lang wie breit. 6. Segment röhrenförmig, etwa doppelt so lang wie das 5. 7. und 8. (*) Segment sehr lang und dünn, röhrenförmig, jedes so lang wie die ersten 5 Segmente zusammen oder fast doppelt so lang wie das 6. Segment. 9. Segment ohne die Schere etwa $\frac{3}{4}$ so lang wie das achte; mit langem und dünnen Stiel, der so lang ist wie der verdichte Endteil ohne die Schere, die schlank und ebenso lang ist.

Flügel lang und sehr schmal, hyalin mit blass bräunlichgelbem Ton, Spitze schwach bräunlich angehaucht.

Pterostigma in beiden Flügeln dunkelbraun; das 3. Viertel (von der Basis aus gerechnet) hyalin. Vorderflügel mit je einem sehr kleinen hellbraunen Fleck: nahe der Basis der Gabelzelle R_1 , an der Basis von r_4 , an der Basis von r_5 und am Ende von cu_1 .

Vorderflügelänge 13,5^{mm}, Hinterflügelänge 12,5^{mm}, Flügelspannung 29,5^{mm}.

Körperlänge (ohne Kopfverlängerung und ohne Schere) 29,5^{mm}; Länge des 7. Gliedes 6,5^{mm}, des 8. Gliedes 6^{mm}. »

I have not examined the type-specimen of *L. tubifera* (Mus. Stettin); but I have seen a sketch of the upper appendage, which is strongly incurved laterally at the apex, the tip is narrow and cut off. In *L. Charpentieri* the tip of upper appendage is prolonged into a narrow and sharply pointed process; in *L. Jacobsoni* the tip is rounded and with a slightly indication of a pointed process.

[*L. Jacobsoni* Weele].

Panorpa jacobsoni WEELE, Notes Leyd. Mus., XXXI, p. 10, fig. 5, 6, pl. I, fig. 4 (1909) (Java).

Leptopanorpa jacobsoni ESBEN-PETERSEN, Notes Leyd. Mus., XXXV, p. 228 (1913).

Head black; rostrum pitchy brown with yellowish lateral margins. Antennae black. Maxillary palpi testaceous; tip of apical joint black. Prothorax blackish brown above; mesothorax pitchy brown anteriorly, reddish brown posteriorly; metathorax reddish brown. Sides of thorax and legs yellowish; tip of apical joints blackish brown. Abdomen black dorsally and ventrally; 2nd to 6th segment with shining greenish blue tinge. Hind border of 3rd segment produced into a slender, cylindrical prolongation as long as one third of the following segment which is provided with a tubercle on its dorsum just below the tip of the prolongation. 6th segment longly cylindrical; 7th and 8th segment much thinner, gradually thickened in their apical part; their apex obliquely truncate above; 7th segment 1 $\frac{1}{2}$ times longer than 6th; 8th a little shorter than 7th. 9th segment rather pedunculate. Branches of lower appendage stout; upper appendage with rounded tip. Chelae long, sharply pointed; their tip reddish brown. Wings long and slender with elliptical tip, brownish black nervures and rather strong yellowish tinge. Of markings only a sooty brown, narrow apical band visible.

Body : 25^{mm}; forewing : 15^{mm}; hindwing : 13^{mm}.

This species is closely allied to *L. Charpentieri*, but the presence of an apical band and the more pedunculate terminal segment are sufficient characters in discriminating the two species. Female not known.

L. javanica Westw. (fig. 100).

Panorpa javanica WESTWOOD, Trans. Ent. Soc. London, IV, p. 186 (1846). — WALKER, Cat.

Neur. Ins. Brit. Mus., p. 460 (1853). — WEELE, Notes Leyd. Mus., XXXI, p. 6 (1909).

Campodotecnum javanicum ENDERLEIN, Notes Leyd. Mus., XXXIV, p. 236 (1912).

Leptopanorpa javanica ESBEN-PETERSEN, Notes Leyd. Mus., XXXV, p. 229 (1913).

Head black; rostrum reddish brown; maxillary palpi brown, the apical joint with black tip. Antennae black; basal joint dark testaceous, second joint dark brown. Thorax black above;

(*) In the description of ENDERLEIN « 6. und 7. ».

sides greyish testaceous to pitchy black. In the female the abdomen is black above; the terminal segments and the venter paler. In the male 2nd to 5th segments black, the three terminal ones dark pitchy brown. Hind border of 3rd segment produced into a slender cylindrical prolongation which reaches the middle of next segment, where a tubercle is found. 6th segment cylindrical; 7th and 8th slender, much thinner than 6th, of equal length and $1\frac{1}{2}$ times longer than 6th; their apical part gradually incrassate towards the apex, which is obliquely truncate above; 9th segment shortly pedunculate. Branches of lower appendage

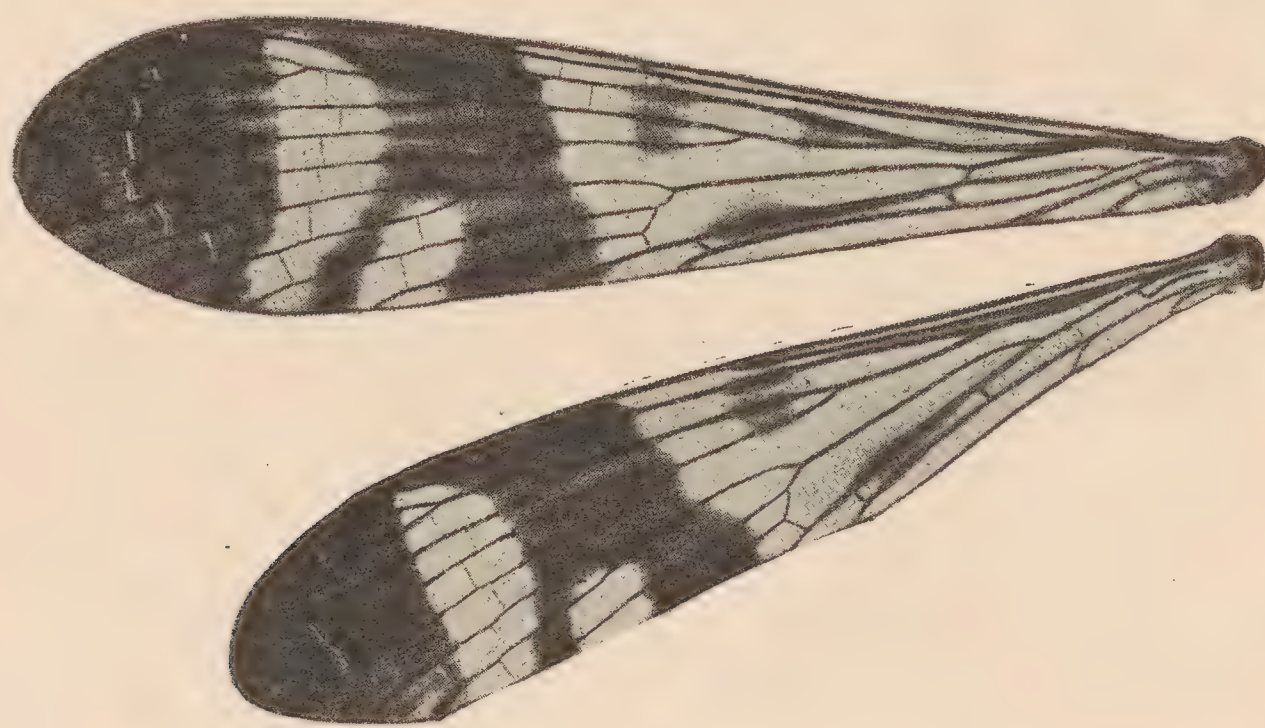


FIG. 100. — *Leptopanorpa javanica* ♂
(Coll. Esben-Petersen).

stout; upper appendage with rounded tip. Femora yellowish; tibiae and tarsi yellowish grey; tip of apical joints blackish. Wings long and slender, whitish with sooty black markings and with elliptical apex. Ab broad, with nearly straight inner margin, sometimes enclosing a whitish spot in its posterior part; along the front margin it is narrowly connected with the broad Ptb, which is forked in its posterior part; Abr narrowest; Msp rather large; Smb sometimes complete in forewing and is sometimes indicated by two separated spots in forewing, by one (posterior) in hindwing; this spot is often formed in both wings as an oblong, basally directed spot.

Body : 21^{mm}; forewing : 9-10,5^{mm}; hindwing, 8-9^{mm}.

Coll. SELYS : 1 ♀ Leito (Burmah, LEONARDO FEA leg.). — Brit. Mus. : 1 ♀ Java (HORSFIELD leg.); 1 ♀ Sumatra (ERICSON leg.); 2 ♀ Mount Wuchi, Hainan, 21. V. 1903. — Mus. Leyden : 3 ♂ Noesa, Kambangang, Java (JACOBSON leg.). — Mus. Stockholm : 2 ♂ Java. — Mus. Berlin : 1 ♀ Java. — Mus. Hamburg : 4 ♀ Carin Chebai, Burmah, 900-1100 m., 5. XII., 1888 (L. FEA leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Noesa, Kambangang, Java (JACOBSON leg.).

The female from Java in British Museum is probably one of the series of WESTWOOD. In 1 ♀ from Sumatra the markings are fenestrate.

I consider at present the specimens from Burmah and Hainan as belonging to *L. javanica*. Some small differences are present. The sides of thorax and the venter of abdomen seems to be somewhat paler. On the dorsum of meso- and metathorax a greyish yellow or pitchy brown lateral streak. In the specimens from Burmah the connection between Ab and Ptb along the front margin very narrow, nearly limited to the black costa; Msp rather large, touching the costa; Smb not abrupted in the middle, crossing the wing from costa to hind margin. As to the markings of the wings the specimens from Hainan agree with the Javanese specimens in every respect. It seems to me that these differences are so small that it at present will be inadmissible to found a new species, when moreover only the female is known.

[*L. pi* Weele].

Panorpa pi WEELE, Notes Leyd. Mus., XXXI, p. 8, fig. 3, pl. I, fig. 3 (1909).

Leptopanorpa pi ESBEN-PETERSEN, Notes Leyd. Mus., XXXV, p. 229 (1913).

Head black; rostrum reddish yellow; maxillary palpi reddish yellow, tip of apical joint dark brown. Antennae brownish black; 1st, 2nd and base of 3rd joints brownish. Thorax shining black above; sides pitchy black. Abdomen above and below shining black with a faint greenish blue tinge. Legs yellowish; tip of tibiae and tarsal joints dark brown. In the male the hind border of third abdominal segment produced into a slender, cylindrical prolongation above, reaching the middle of next segment, the dorsum of which is provided with a small tubercle just below the tip of the prolongation. 6th segment cylindrical, slightly narrowed towards the apex; 7th $1\frac{1}{3}$ times longer than 6th, 8th a little longer; both segments cone-shaped in their apical part, and their tips obliquely truncate above. 9th segment shortly pedunculate. Branches of lower appendage with rounded tip. Wings long and slender with elliptical tip, with a faint yellowish grey tinge, with dark brown veins and with sooty brown markings. The typical form has a broad Ptb, which is forked posteriorly; Abr very narrow and often absent; Ab only indicated with a very narrow streak along the apical margin. This streak is sometimes absent, sometimes present as a rather broad band with oblique inner margin, which has a distal prominency.

Body (♂) 20^{mm}; forewing : 14^{mm}; hindwing : 12,5^{mm}.

Coll. SELYS : not present. — Mus. Leyden : 3 ♂ Java (JACOBSON leg.). — Mus. Berlin 1 ♂ Java (HOFFMANNSEGG leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Nongkodjadar, Java (JACOBSON leg.).

[*L. effusa* Navás] (fig. 101).

Campodotecnum effusum NAVÁS, Revue Russe d'Ent., XIII, p. 429, fig. 7a, b, c (1914).

Face and rostrum yellowish brown, palpi yellowish brown. Vertex brownish black; ocelli reddish. Antennae dark brown, 1st joint yellowish; 2nd yellowish with dark brown tip; 3rd pale brown, basally blackish. Prothorax above black; front half of mesothorax above black with narrow yellowish sides and front margin; mesothorax posteriorly and metathorax yellowish brown. Sides of thorax yellowish brown with four

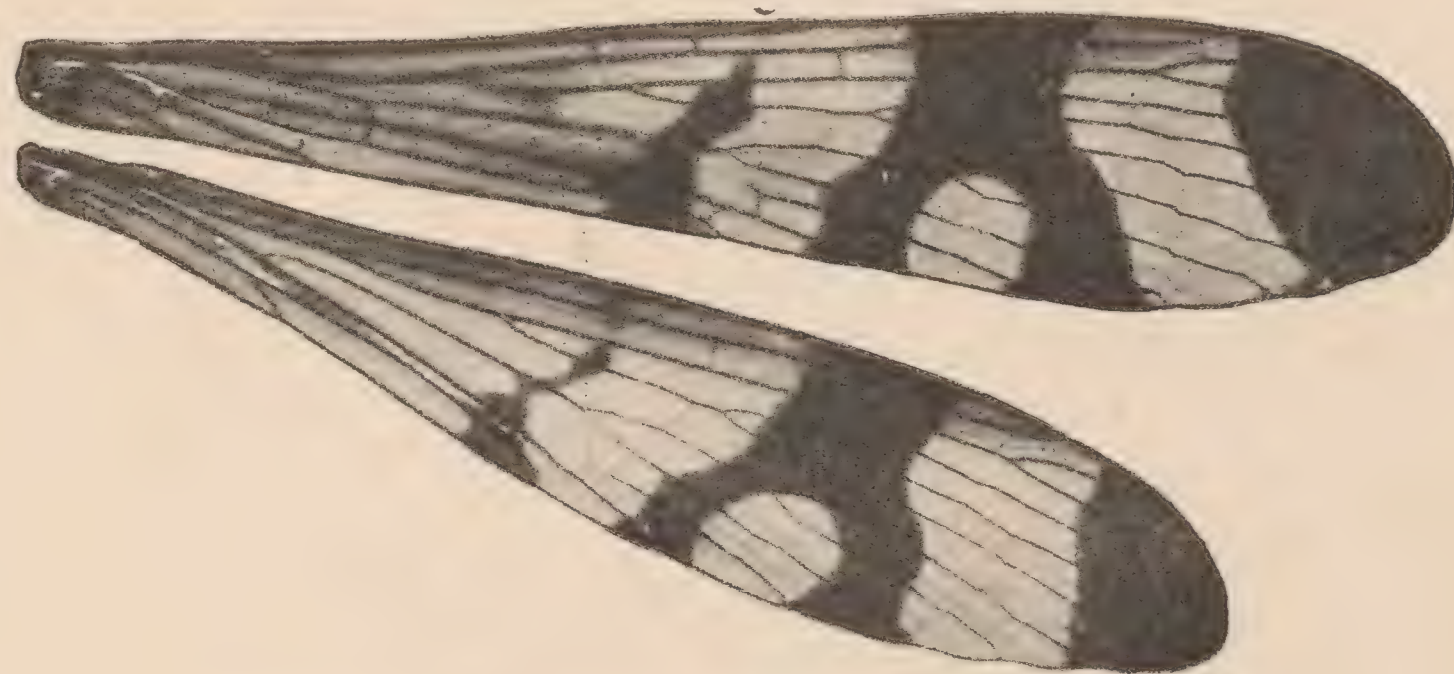


FIG. 101 — *Leptopanorpa effusa* ♂ type specimen (Museum Vienna).

small black dots. Abdomen brown; the last three segments yellowish brown. The first four segments broader than long; 5th as long as broad; 6th cylindrical, narrower, two and a half times as long as broad, its dorsal margin slightly incurved and its apex somewhat obliquely truncate above. 7th and 8th narrower than 6th, thickened towards apex, each of them of the same length as 6th; their apex obliquely truncate above. Apical segment sessile, rather stout and a little longer than 8th. The chelae are rather slender, curved and their basal part very strongly longhaired. Lower appendages flattened, with a blunt dent in the middle of inner margin and broadened towards apex, which is rounded. Upper appendage slightly narrowed towards apex, which is provided with a rectangular sharply pointed prolongation. Titillators very long, thread-like and somewhat curved. Hind border of 3rd abdominal segment above provided with a narrow cylindrical prolongation, resting upon a transversely placed keel-shaped elevation of 4th segment; this elevation is placed one third

from the front border of 4th segment. Legs yellowish; tip of tarsal joint blackish. Wings with a strong yellowish tinge, the veins yellowish and a little darker than the membrane. Ptb and Ab broad and sooty brown. Across the middle of wing is found a sooty brown streak, broadest behind. Subcosta joins the costa before pterostigma.

Length of body : 20^{mm}; forewing : 16^{mm}; hindwing : 14.5^{mm}.

Coll. SELYS : not present. — Mus. Vienna : 1 ♂ Silekim, 1875 (FELDER leg.) (type of NAVÁS).

It is with some hesitation I place this species in *Leptopanorpa*. Its rather stout and relatively short abdomen, its sessile terminal segment and its long titillators separate it from the other species in the genus.

Genus **PANORPODES** Mac Lachlan.

Panorpodes MAC LACHLAN, Trans. Ent. Soc. London, p. 188 (1875). — ID., Ent. Monthl. Mag., XVIII, p. 37 (1881). — BANKS, Trans. Am. Ent. Soc., XXXIX, p. 231 (1913). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 375 (1913).

Rostrum very short, more or less narrowed towards apex. Genae with a large, downwards directed tooth, very large in American species, smaller or totally absent in Japanese species. Basal joint of maxillary palpi short, 2nd to 5th longer and subequal, somewhat flattened. Labrum with a rather deep incision at its apex. Tarsal claws simple, not serrate, strongly curved. In the male the abdomen is short; all the segments, excepting the terminal one, are narrow and transverse, especially the 8th.

The differences between the Japanese and American species mentioned by MAC LACHLAN in Ent. Monthl. Mag., XVIII, p. 37-38 (1881) are not of so great value as supposed by him. The rostrum is longer in the Japanese species than in the American ones; but when MAC LACHLAN says that the former species want the tooth on the genae, it is not correct. The tooth is present at least in one of the species, but it is placed nearer to the apex of rostrum, which therefore is narrower at the base and gets a more slender appearance. As to the shape of the maxillary palpi I am not sure if the 3rd and 4th joints are more dilated in Japanese species than in the American ones; when it often seems so, I think that it is due to the fact that swollen and soft joints very often get a flattened appearance when dried. At all event I cannot see that the differences are of such importance that they will rectify the creation of a new genus for the American species.

Habitat : Japan, North America.

Type : *P. paradoxa* MAC LACHLAN.

Japanese species.

P. paradoxa Mac Lachl. (fig. 102) (plate II, fig. 18).

Panorpodes paradoxa MAC LACHLAN, Trans. Ent. Soc. London, p. 188 (1875). — ID., Ent. Monthl. Mag., XVIII, p. 37 (1881). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 375, pl. 37, fig. 1; pl. 31, fig. 8a, 8b (1913).

Panorpodes paradoxa subsp. *stigmatica* MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 376, pl. 37, fig. 2 (1913).

Head and rostrum yellowish brown; maxillary palpi yellowish brown, tip of apical joint black. On vertex a shining black spot enclosing the ocelli. Antennae yellowish brown. Lateral

margins of rostrum with a strong dent in its first third and narrowed towards apex in the following third. Thorax and abdomen brown above, paler on the venter. Legs yellowish, tip of tibiae and of tarsal joints brown. Wings broad with elliptical apex. Membrane yellowish; longitudinal veins a little darker; cross veins hardly visible; pterostigma orange. No markings. In the forewing Sc as a rule extends into the pterostigmatal area. In the male the lower

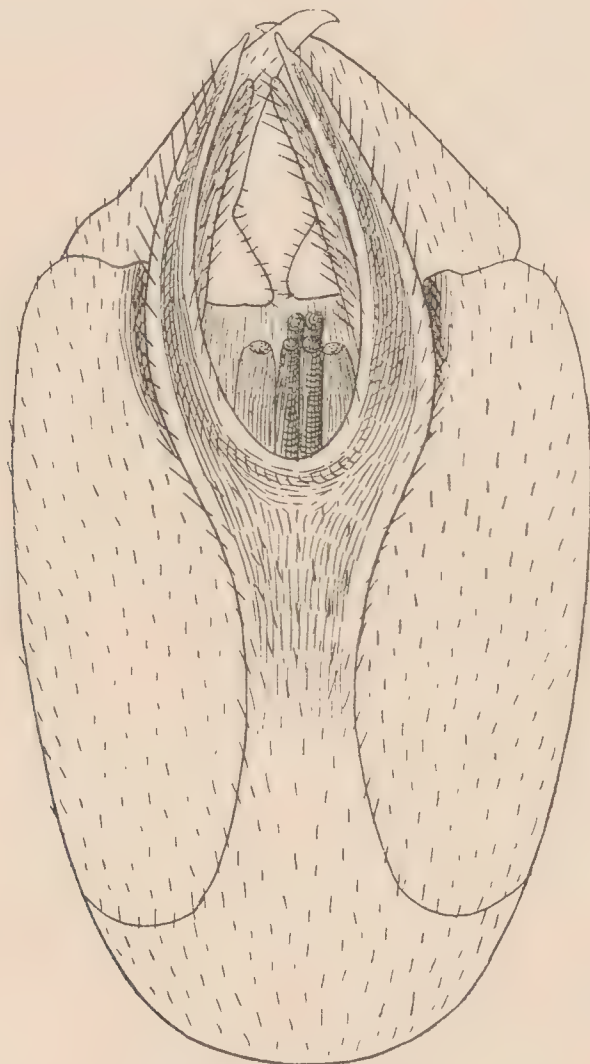


FIG. 102. — *Panorpodes paradoxa* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

appendage is very long and extends almost to the tip of cheliferous segments; it is branched in its terminal third, and the branches are pointed towards apex. Titillators cylindrical and very long. Upper appendage broad and short; its apex truncate slightly emarginate.

Forewing : 15-17^{mm}; hindwing : 13-15.5^{mm}.

Coll. SELYS : 4 ♂, 1 ♀ Oiwiki, Japan, June-July, 1881 (PREYER leg.). — Coll. ESBEN-PETERSEN : 4 ♂, 1 ♀ Shinano, Japan, 5. 8. 1911 (ex. Coll. MIYAKÉ).

I have a male before me, in which the subcosta in the forewings joins the costa far before the pterostigmatal region.

[*P. apicalis* Miyaké] (fig. 103).

Panorpodes apicalis ♀ MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 203, pl. XI, fig. 4 (1910).

Panorpodes naevia MIYAKÉ (nec NAVÁS), Journ. Coll. Agr. Imp. Univ. Tokyo, IV, pl. XXXVII, fig. 3, p. 376 (1913).

Head, thorax and abdomen ochraceous. Maxillary palpi ochraceous, apical joint with brownish black tip. Vertex dark brown between the ocelli. Antennae ochraceous. No dent on the lateral margins of rostrum, which is gradually narrowed towards the tip. Thorax testaceous above. Abdomen greyish brown dorsally; terminal segments yellowish brown. Legs yellow; tip of tibiae and of tarsal joints narrow brownish banded. Wings pale ochraceous with rounded apex. Veins greyish brown. Apical band very narrow, fuscous, sometimes absent. No other markings present. The cross veins very indistinct. Pterostigma hardly visible.

Forewing : 15-17^{mm}; hindwing : 13-15^{mm}.

Coll. SELYS : not present. — Coll. MIYAKÉ : 1 specimen (abdomen lost), Japan (cotype). — Coll. ESBEN-PETERSEN : 1 ♀ Mitake, Japan (NAKAHARA leg.).

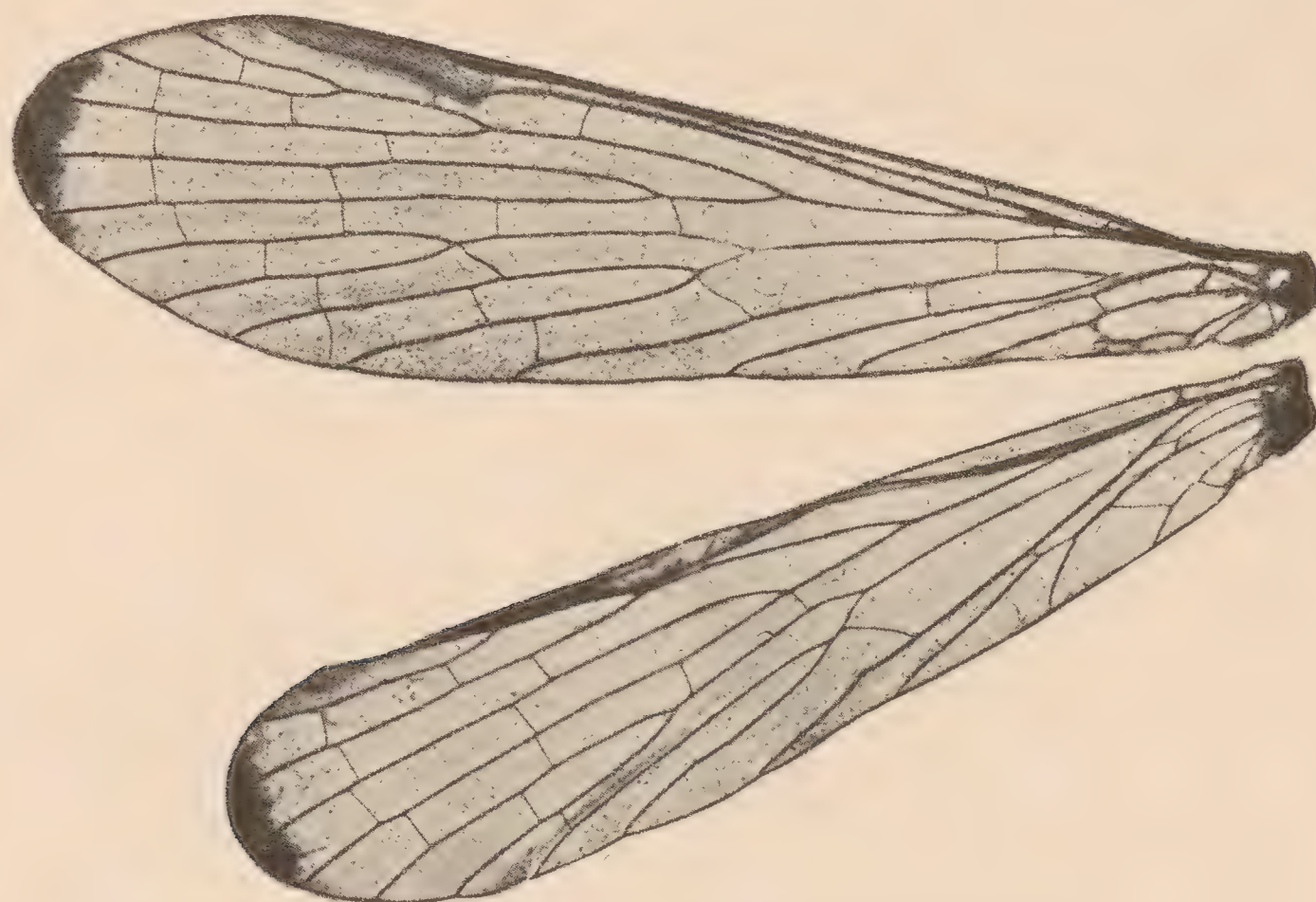


FIG. 103. — *Panorpodes apicalis* ♀ cotype
(Coll. Miyaké).

This species has very great likeness to *P. naevia* NAV.; but I think that it is a good and distinct species, recognizable by its more broadly rounded apex of wings. My specimens want the apical band, and on that account it somewhat gets the appearance of *P. paradoxa*, from which it is separated by more slender wings, which have a more hyaline membrane, by the darker longitudinal veins and the indistinct pterostigma.

[*P. naevia* Nav.] (fig. 104).

Panorpa naevia NAVÁS, Revue Russe d'Ent., p. 273, fig. (1909).

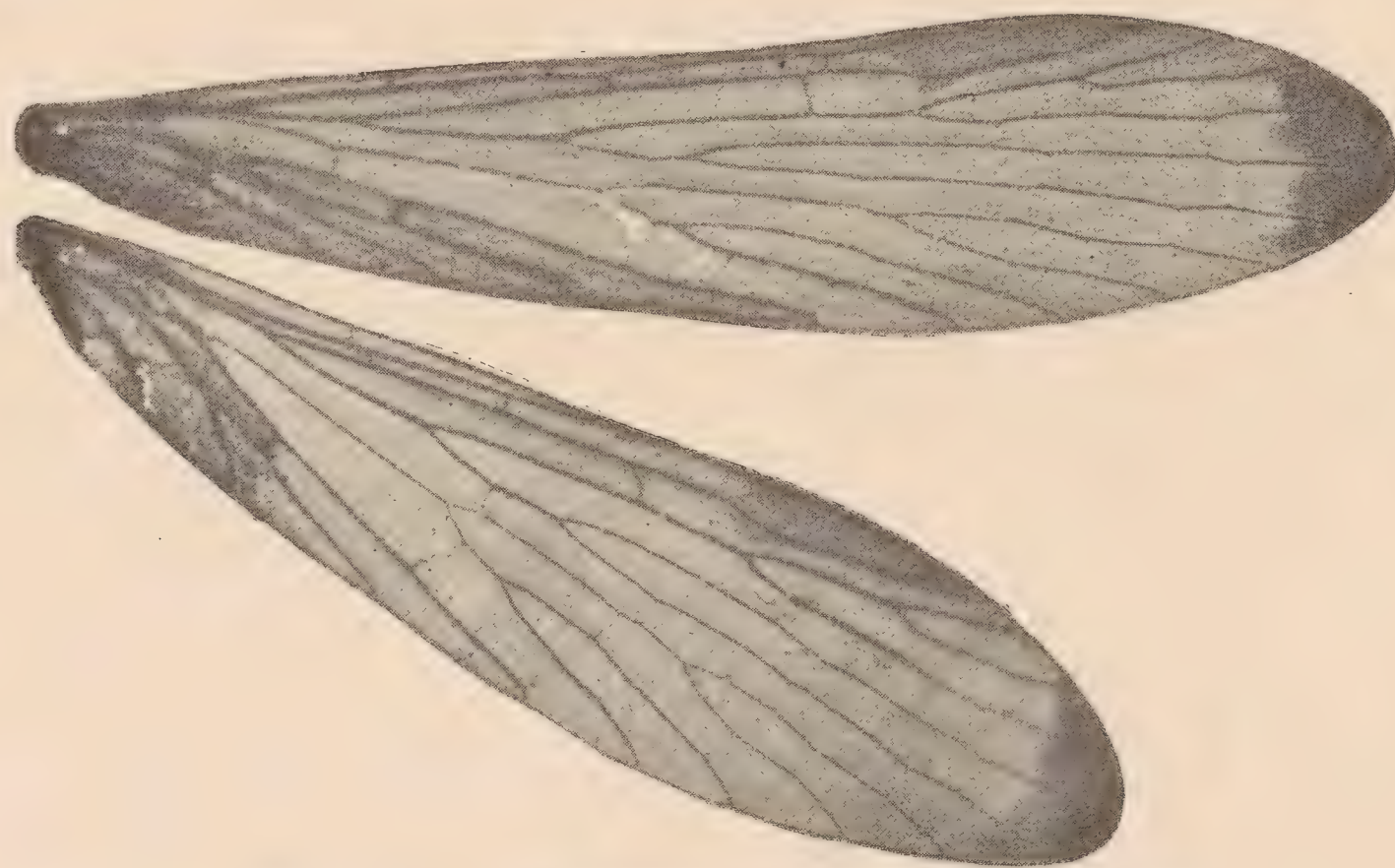


FIG. 104. — *Panorpodes naevia* ♀ type-specimen
(Museum Paris).

Head and rostrum reddish brown. On vertex a blackish spot enclosing the ocelli. Antennae blackish brown, basal joints paler. Prothorax pale reddish brown. Abdomen reddish brown. Legs yellowish brown; coxae and tip of tarsal joints darker. Wings elongate with elliptical apex. Membrane with strong yellowish tinge and darker veins. Pterostigma hardly visible. Ab narrow, sooty brown and with nearly straight inner margin. No other markings.

Forewing : 15^{mm}; hindwing : 14^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♀ Nippon (type).

[*P. decorata* Mac Lachl.] fig. 105.

Panorpa decorata MAC LACHLAN, Bull. Soc. ent. Suisse, p. 405 (1887). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, pl. XXXVII, fig. 7 (1913).

Panorpa limbata NAVÁS, Revue Russe d'Ent., p. 274, fig. (1909).

Panorpodes notata NAVÁS, Revue Russe d'Ent., p. 274, fig. (1909). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 380 (1913).

Panorpodes singularis MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 204, pl. XI, fig. 7 (1910).

Panorpodes decorata subsp. *singularis* MIYAKÉ, Ibid., IV, p. 378, pl. XXXVII, fig. 4 (1913).

Panorpodes decorata subsp. *limbata* MIYAKÉ, Ibid., p. 378, pl. XXXVII, fig. 5 (1913).

Panorpades decorata subsp. *confusa* MIYAKÉ, Ibid., p. 379, pl. XXXIV, fig. 11, pl. XXXVII, fig. 6 (1913).

Head and rostrum ferrugineous; maxillary palpi brown, tip of apical joint blackish. On the vertex a blackish spot, enclosing the ocelli. Antennae blackish. On the lateral margin of rostrum a small, blunt dent one third from base; below the dent the rostrum is narrowed towards apex for the next third. Thorax and abdomen dark ferrugineous to blackish, tip of abdomen paler. Legs testaceous; coxae, tip of tibiae and of



FIG. 105. — *Panorpodes decorata* ♀
Type of *P. limbata*
(Museum Paris).

tarsal joints dark brown or blackish. Wings long and rather broad, tip elliptical. Membrane hyaline, lactaceous with brown veins (yellowish basally) and with sooty brown markings. Ab very narrow, narrowly connected with Ptb along the front and hind margin. Ptb forked one third from the front margin, its two branches, especially the apical one, often interrupted and only indicated by one or two spots on the hind margin. Msp very large, narrowly connected with Ptb along the front margin, as a rule with Bbr. Smb indicated by a spot near the hind margin, and a basal spot, also near to the hind margin, often present.

Forewing : 14-15^{mm}; hindwing : 12-13^{mm}.

Coll. SELYS : not present. — Mus. Paris : 2 ♀ Nippon (types of *limbata* and *notata*). — Coll. MIYAKÉ : 1 ♀ Japan (cotype of *P. singularis*). — Coll. ESBEN-PETERSEN : 1 ♀ Nikko (NOHIRA leg.).

The species is a very variable one as to the markings of wings, and only the specimen in my own collection agrees with the description given by MAC LACHLAN. The three other specimens examined by me were somewhat immature, but I have no doubt that they belong to the species of MAC LACHLAN. MIYAKÉ (*loc. cit.*) is of the same opinion concerning *singularis* and *limbata*.

American species.**P. oregonensis** Mac Lachl. (fig. 106).

Panorpodes oregonensis MAC LACHLAN, Ent. Monthl. Mag., XVIII, p. 37, fig. (1881). — HINE, Bull. Sci. Lab. Denison Univ., XI, p. 253 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 33 (1907).

Head and rostrum yellowish brown. Lateral margins of rostrum below the eyes with a triangular production. On vertex a black spot enclosing the ocelli. Antennae yellowish brown, greyish brown towards apex. Thorax and abdomen dark brown above, terminal segments and

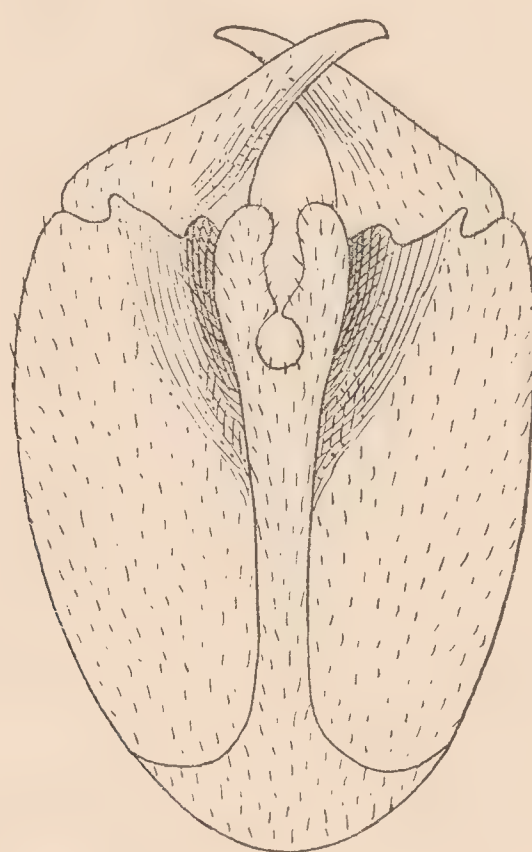


FIG. 106. — *Panorpodes oregonensis* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

venter paler. Legs yellowish brown, tip of tibiae and of tarsal joints darker. Wings without markings, rather slender, apex elliptical. Membrane pale yellowish; veins very pale; pterostigma indistinct. In the male the lower appendage is very long, reaching the base of the cheliferous segments; it is cleft in its apical fourth; the branches flattened and with a production on their inner margin. Upper appendage broad and short; its apex truncate.

Female not known.

Forewing : 10-11^{mm}; hindwing : 9,5-10^{mm}.

Coll. SELYS : 1 ♂ Mount Hood, North Oreg. (the specimen is labelled in the handwriting of MAC LACHLAN and marked « Type »). — Coll. ESBEN-PETERSEN : 1 ♂ Mary's Peak, Oreg. (ex. coll. BANKS). — Mus. Stockholm : 2 ♂ Washington Territ. (MORRISON leg.).

[P. carolinensis Banks] (fig. 107).

Panorpodes carolinensis BANKS, Bull. Am. Mus. Nat. Hist., XXI, p. 215 (1905). — ID., Trans. Am. Ent. Soc., XXXII, p. 8 (1906). — ID., Cat. Neur. Ins. U. S., p. 33 (1907). — ID., Trans. Am. Ent. Soc., XXXVII, p. 349 (1911).

Head and rostrum yellowish brown (in the female rostrum has a broad dark brown median streak). On vertex a brownish black spot enclosing the ocelli. Lateral margins of rostrum with a triangular tooth below the eyes. Antennae blackish; the two basal joints paler. Thorax and abdomen brown; the apical

segments and the venter paler. Legs yellowish; tip of tibiae and of tarsal joints darker. Wings rather broad towards tip, which is rounded. Membrane pale yellowish; veins very pale; pterostigma indistinct. Sc in forewings extends into the pterostigmatal region. The wings of the female are very short and more slender.

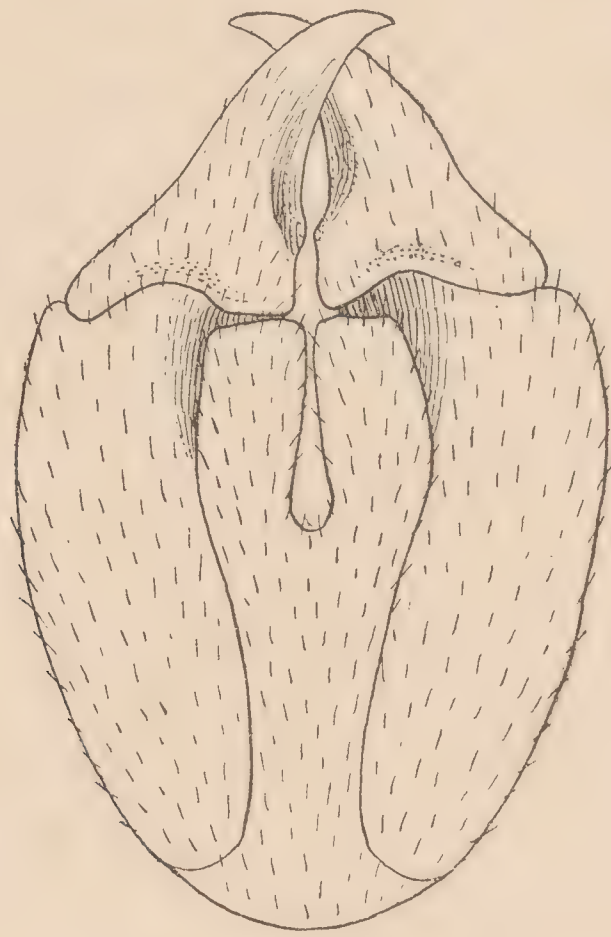


FIG. 107. — *Panorpodes carolinensis* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

In the male the lower slender appendage is long, reaching the base of the chelae; it is cleft in its apical third; the branches are flattened; their apex truncate. Upper appendage broad, its apex truncate. Chelae with a large, blunt dent at their base.

♂. Forewing : 12-13^{mm}; hindwing : 10,5-11^{mm}.

♀. Forewing : 5^{mm}; hindwing : 4^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 7 ♂, 2 ♀ Black Mount., N. Carol. (ex coll. BANKS).

SUBFAM. CHORISTINAE.

Costal area not unusually broad, narrower in hindwing than in forewing and with one or more simple cross veins. The subcosta joins the costa a little beyond the middle of the wing. Between radius and costa one cross vein in the pterostigmatal region. Both in fore- and hindwing Cu¹ fuses with M for a very short distance, and in the hindwing the Cu² coalesces with the 1A for a longer distance. In fore- and hindwing are present R¹, R², R³, R⁴ and R⁵; in forewing M⁴ is forked, but not in the hindwing. Venation more dense than in the *Panorpinae*. The much raised hind margin of the head somewhat prolonged backwards. Claws serrate basally.

The subfamily is restricted to Australia.

TABLE OF GENERA.

Costal area in forewing with only a basal cross vein.

Chorista.

Costal area in forewing with more than one cross vein.

Taeniochorista.

Genus **CHORISTA** Klug 1836.

Chorista KLUG, Abh. Königl. Akad. Wiss., p. 101 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 454 (1853). — BRAUER, Verh. zool.-bot. Ges., p. 413 (1868). — MAC LACHLAN, Trans. Ent. Soc., p. 70 (1869). — Ibid., p. 189 (1875). — ENDERLEIN, Zool. Anz., XXXV, p. 394 (1910). — BANKS, Trans. Am. Ent. Soc., XXXIX, p. 232 (1913). — TILLYARD, Proceed. Linn. Soc. N. S. W., p. 395-408 (1918).

Euphania WESTWOOD, Trans. Ent. Soc. London, IV, p. 188 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 464 (1853). — BRAUER, Verh. zool.-bot. Ges., p. 413 (1868). — MAC LACHLAN, Trans. Ent. Soc. London, p. 70 (1869).

Wings narrow, longer than the body, narrowed towards the rounded apex; forewing about three times longer than broad. Costal area with a basal cross vein. Sc joins the costa before pterostigma. In both pairs of the wings Cu¹ and the main-stem of M only touch each other. In the forewing 2A runs almost parallel to 1A during its whole length.

Type : *Ch. australis*.

[**Ch. australis** Klug] (fig. 108, 109, 110).

Chorista australis KLUG, Abh. Königl. Akad. Wiss., p. 101, fig. 8 et C (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 454 (1853). — BRAUER, Verh. zool.-bot. Ges., p. 413 (1868). — MAC LACHLAN, Trans. Ent. Soc. London, p. 70 (1869). — Ibid., p. 189 (1875). — BANKS, Trans. Am. Ent. Soc., XXXIX, p. 232 (1913). — TILLYARD, Proceed. Linn. Soc. N. S. W., p. 395-408 (1918).

Euphania luteola WESTWOOD, Trans. Ent. Soc. London, IV, p. 188, pl. 14, fig. 1 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 464 (1853). — BRAUER, Verh. zool.-bot. Ges., p. 413 (1868). — MAC LACHLAN, Trans. Ent. Soc. London, p. 70 (1869).

Head and rostrum yellowish brown. On the vertex a blackish spot enclosing the ocelli. Antennae blackish; the two basal joints pale reddish brown. Thorax and abdomen pitchy black; the terminal segment

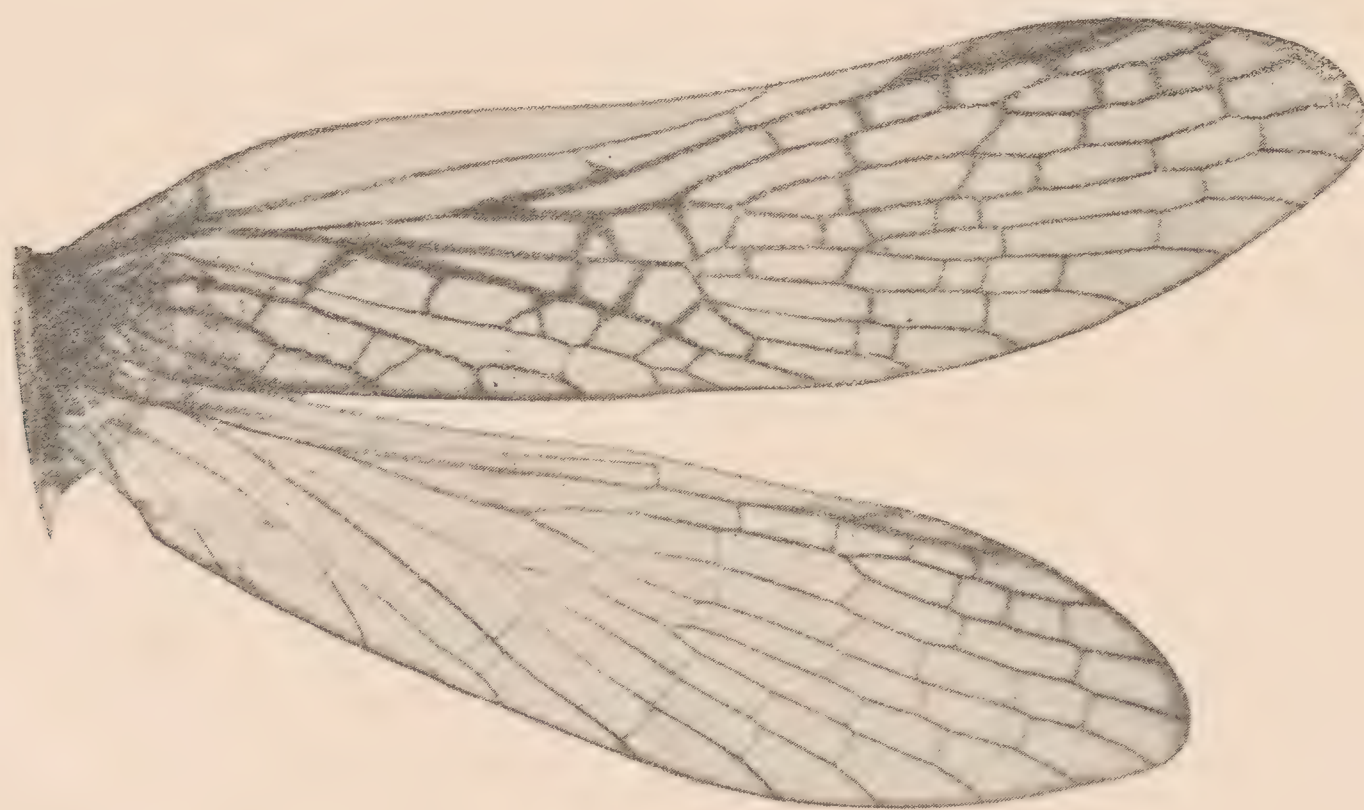


FIG. 108. — *Chorista australis* ♂
(Coll. Tillyard).

of abdomen yellowish brown. Coxae, tibiae and tarsi brownish black; the femora yellowish brown with

blackish tip. Wings with strong yellowish brown tinge and with brown venation. In the forewing the basal half part of C and Sc is yellowish; all the other longitudinal veins only yellowish at their base. In the hindwing only the apical half part with brownish venation, the basal part with yellowish venation. All the

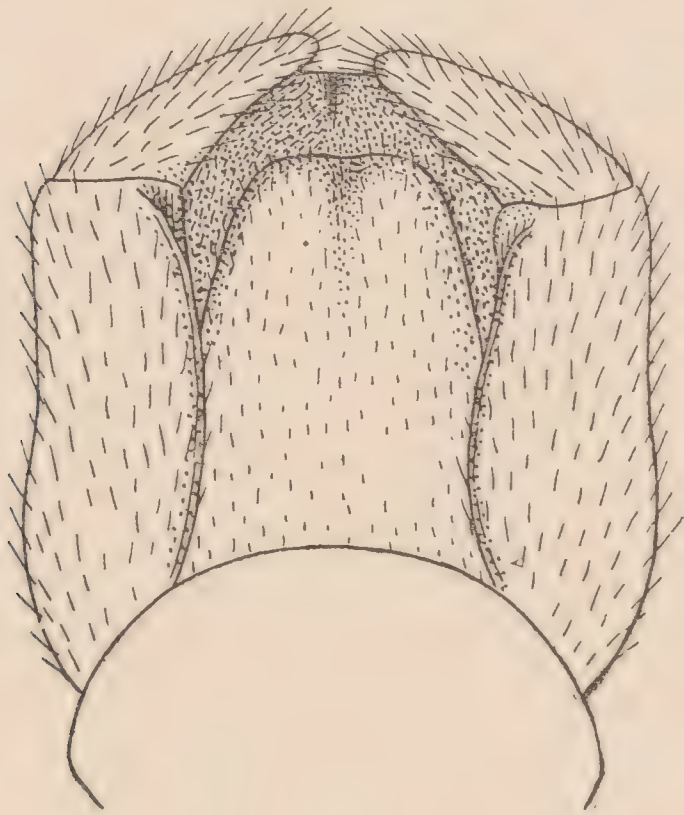


FIG. 109. — *Chorista australis* ♂
Dorsal view of terminal segment
(Coll. Tillyard).

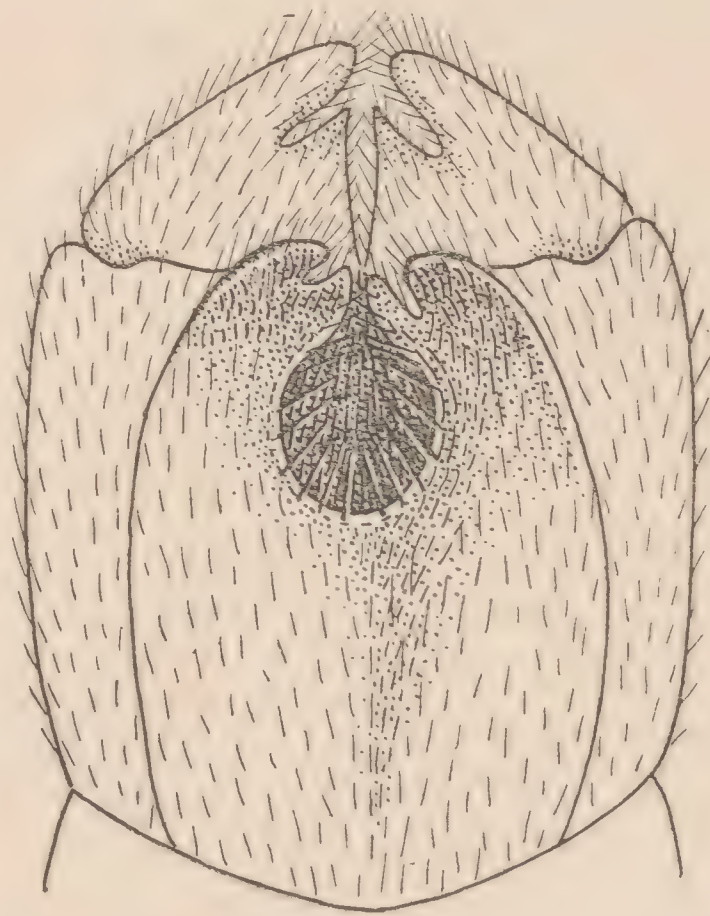


FIG. 110. — *Chorista australis* ♂
Ventral view of terminal segment
(Coll. Tillyard).

brownish veins (also the cross veins) in the forewing narrowly brownish shaded, in the hindwing are only the cross veins in the apical part faintly and narrowly brownish shaded. Pterostigma long, dark brown, very distinct.

Length of forewing : 21^{mm}; that of hindwing : 19^{mm}.

Coll. SELYS : not present. — Coll. TILLYARD : 1 ♂ Australia. — Coll. ESBEN-PETERSEN : 1 ♀ Australia (ex coll. TILLYARD).

I have seen the type-specimen (♀) of *australis* in the Museum Berlin. The type-specimen (♀) of *Euphania luteola* is placed in British Museum. BANKS, who has seen *luteola*, communicates (in litt.) that the eight basal joints of the antennae are yellowish. The female specimen before me has the two basal joints of the antennae reddish brown as in the male, but the third to eight joints are yellowish brown.

The species may at first sight be separated from *Ch. ruficeps* by its distinctly marked pterostigma and by its brownish shaded veins.

Ch. ruficeps Newm. (fig. 111, 112) (plate II, fig. 17).

Panorpa ruficeps NEWMAN, The Zoologist (1850). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 464 (1853). — MAC LACHLAN, Trans. Ent. Soc. London, p. 70 (1869). — Ibid., p. 189 (1875). — BANKS, Trans. Am. Ent. Soc., XXXIX, p. 232 (1913).

Head, rostrum and maxillary palpi yellowish, the tip of apical joint of maxillary palpi blackish. Ocelli black. Antennae slender, longer than the wings, black; first, second and basal half of third joint reddish yellow. Thorax and abdomen dorsally black, the terminal abdominal segment reddish yellow. The sides of thorax testaceous and the venter of abdomen castaneous. Coxae and femora yellowish brown; tibiae, tarsi and tip of the femora pitchy brown. Wings hyaline with a slight yellowish brown tinge. The veins yellowish brown. Pterostigma

yellowish, indistinct. Upper appendage in the ♂ broad and short, nearly quadrate; the apical

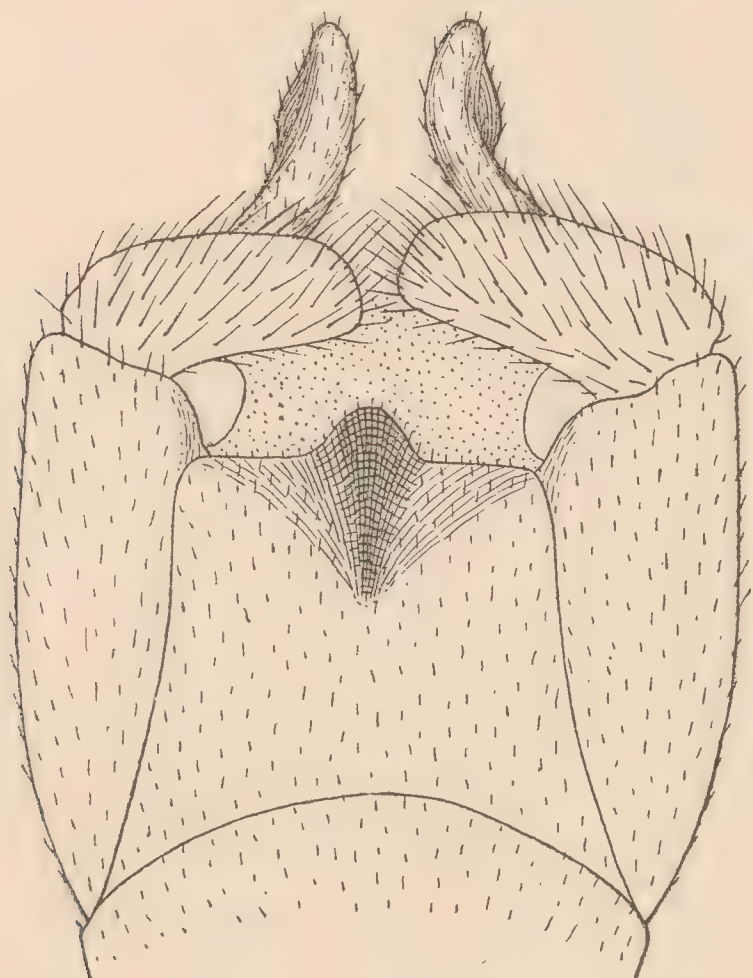


FIG. 111. — *Chorista ruficeps* ♂
Dorsal view of terminal segment
(Coll. Selys).

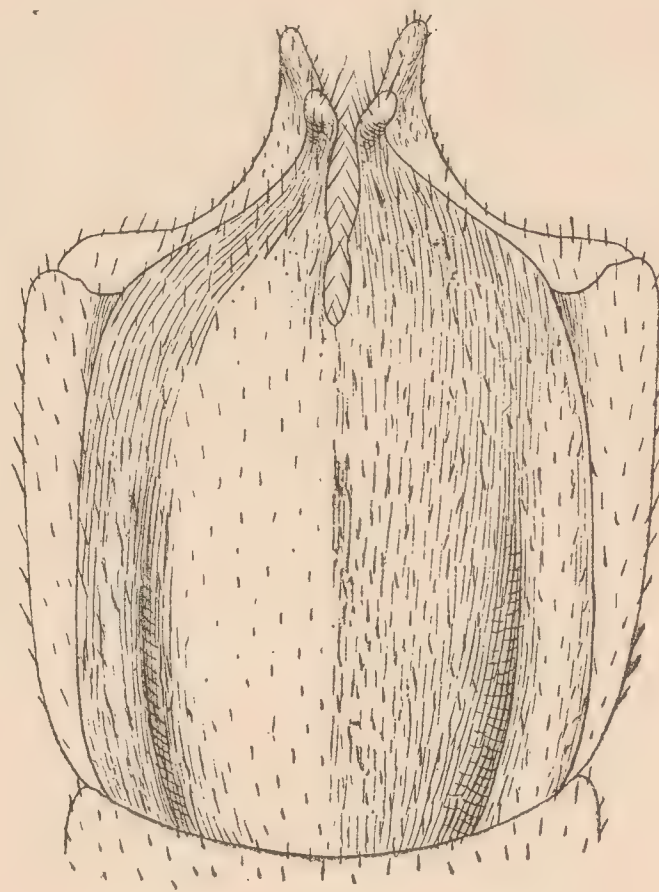


FIG. 112. — *Chorista ruficeps* ♂
Ventral view of terminal segment
(Coll. Selys).

margin produced in the middle into a rounded flap. Lower appendage keel-shaped; the apical part narrowed towards the tip, which is cleft.

Length of body : 12^{mm}; forewing : 17^{mm}; hindwing : 15^{mm}.

Coll. SELYS : 1 ♂ Melbourne (EDWARDS leg.). — Coll. FROGGATT : 1 ♂ N. S. Wales.

Genus **TAENIOCHORISTA** Esben-Peters. (1914).

Taeniochorista ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 129 (1914). — TILLYARD, Proceed. Linn. Soc. N. S. W., p. 737-740, fig. 7 (1918).

Wings not so long as the body; forewing two and a half times longer than broad and with rounded apex. In the two basal thirds of costal area 5 to 7 cross veins. M and Cu¹ fuse for a very short distance. In the forewing 2A, one third from base, is curved towards 1A.

Type : *T. pallida*.

[**T. pallida** Esben-Peters.] (fig. 113, 114) (plate II, fig. 19).

Taeniochorista pallida ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 129 (1914).

Head and rostrum yellowish brown; eyes black; ocelli large and very prominent, each of them surrounded by a narrow brownish circle. The two basal joints of antennae yellow; the basal one stout, broader than long, the second smaller, as long as broad. Apical joint of maxillary palpi somewhat hastiform, strongly pointed at the tip. Thorax dorsally dark brown, laterally and ventrally paler, yellowish brown to greyish brown. Prothorax about three times broader than long, traversed by some sulci and with long brownish black spines along the front margin. Abdomen subcylindrical, dark brown above, brownish yellow on the venter and at the apex. Legs yellow in the ♂, greyish yellow in the ♀; the basal third of fore and intermediate tibiae greyish black; the tip of hind tibiae and of the tarsal joints narrowly blackish banded. Claws with 6-7 fine teeth on their inferior side. Wings hyaline; longitudinal veins and basal cross veins brownish yellow; the rest of cross veins whitish. All cellules in forewing with the exception of those in the costal and subcostal

areas with a pale smoky grey tinge, which does not touch the cross veins, but nearly always the longitudinal veins; therefore the apical part of forewings seems to be transversely banded. In the ♂ the rostrum is nearly as broad at the tip as the distance between the eyes, laterally with two incisions, a smaller one near

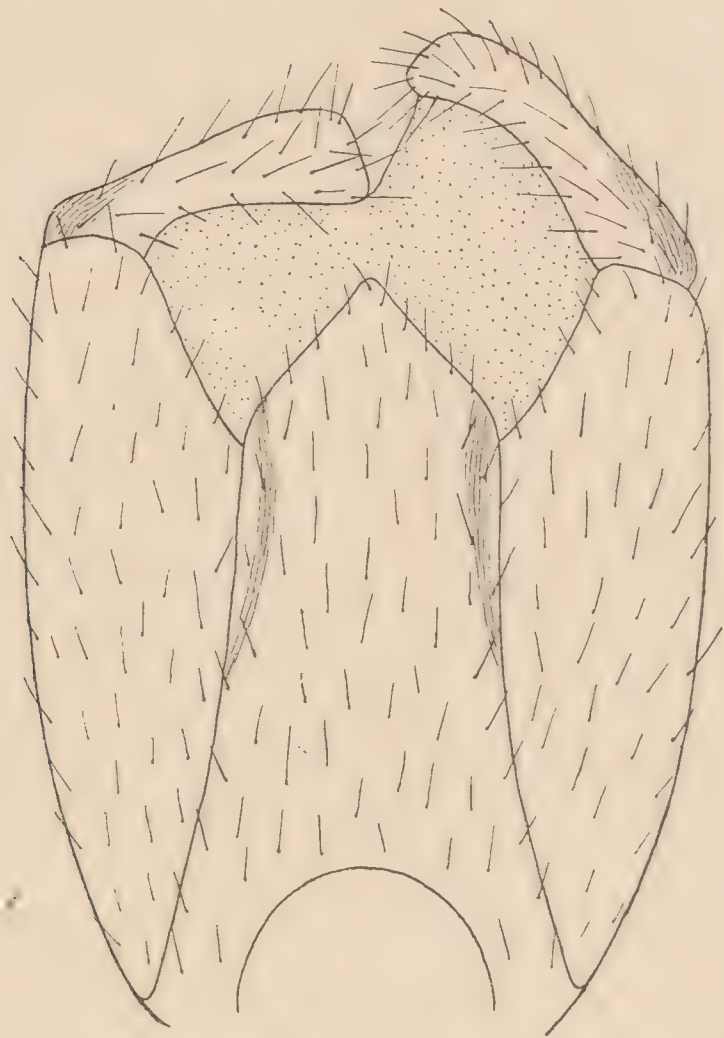


FIG. 113. — *Taeniochorista pallida* ♂
Dorsal view of terminal segment
(Coll. Esben-Petersen).

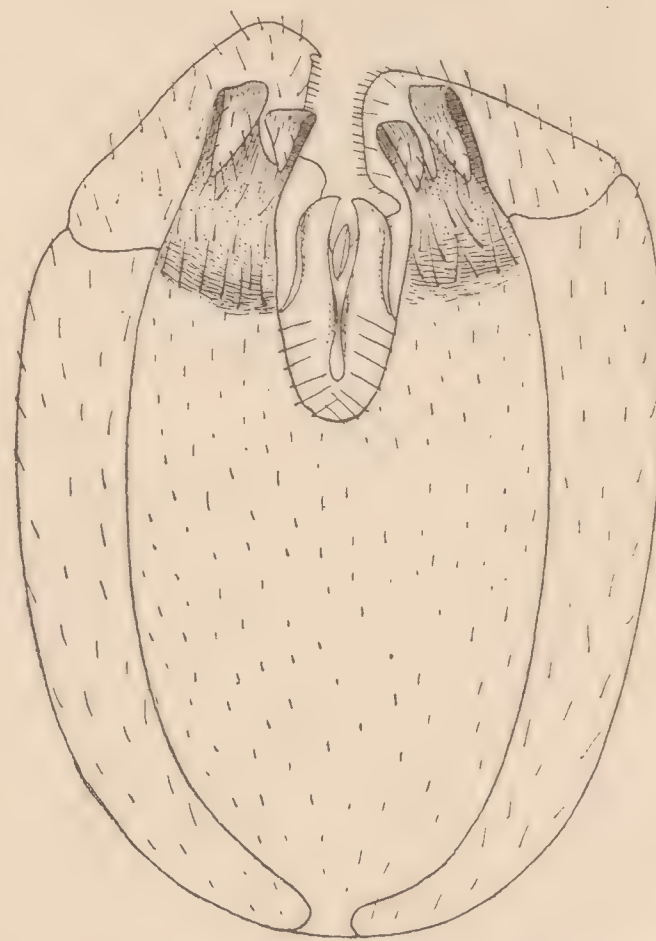


FIG. 114. — *Taeniochorista pallida* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

the tip and a broader one about in the middle. Maxillary palpi brownish yellow, densely long-haired: 3rd joint stout and a little curved. In the ♀ the rostrum is more narrowed towards apex; 3rd joints of maxillary palpi not thicker than the other joints.

Length of forewing : 17^{mm}; hindwing : 15^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♂ Australia, 2-47 (J. VERREAUX leg.). — Coll. TILLYARD : 1 ♀ Brisbane, H. HACKER, 11.5.12. — Coll. ESBEN-PETERSEN : 1 ♂ Brisbane (ex coll. TILLYARD).

In « Trans. Am. Ent. Soc., XXXIX », p. 232, 1913 BANKS mentions that he in several of the European museums has seen specimens of a species labelled as *Euphania* but with more cross veins in the costal area; those specimens belong to the species here described. The ♂ from Museum Paris was labelled *Eusthenia spectabilis*.

SUBFAM. NANNOCHORISTINAE.

Costal area of usual breadth. Two cross veins between C and Sc in the forewing, one in the hindwing. Sc joins the R or the C in the forewing in a more or less wide distance from pterostigma; in the hindwing Sc joins the C much before pterostigma. R¹, R²⁺³, R⁴, R⁵, M¹, M², M³ and M⁴ are present in both pairs of the wings. Both in fore- and hindwing Cu¹ and the main-stem of M coalesce for a rather long distance. In the hindwing Cu² and 1A only touch each other at a point. 1A, 2A and 3A present in both fore- and hindwing. Rostrum rather short and strongly pointed towards apex. Claws serrate basally. In the male the abdomen is short; all the segments excepting the terminal ones are narrow and transverse.

TILLYARD (Proc. Linn. Soc. N. S. W., pp. 284-301, 1917) has given this group family rank within the *Mecoptera*; but I do not agree with him in that view. The *Nannochoristinae* are nearer allied to the *Panorpinae* than to the *Choristinae*, and the most peculiar feature in the wing-venation is the position of Sc in the forewing, the reduction of the radial forks — fusion of R² and R³ — and the characteristical direction of 1A in the hindwing, where the

apical part of 1A seems to be a branch from 2A. The venation is rather open as in the *Panorpinae*, from which the *Nannochoristinae* may be separated as a more highly specialized group with especially reduced venation of the wings. With regard to the short rostrum and to the shape of the abdomen in the male sex the subfamily has some likeness to the genus *Panorpodes*.

The subfamily is only known from Australia, Tasmania and New Zealand.

TABLE OF GENERA.

1. The area between R^4 and R^5 divided by a cross vein into two cells.

Nannochorista TILL.

2. The area between R^4 and R^5 is not divided by a cross vein into two cells.

Choristella TILL.

Genus **NANNOCHORISTA** Tillyard (1917).

TILLYARD, Proc. Linn. Soc. N. S. W., p. 292 (1917).

Hindwing somewhat shorter than the forewing. In the forewing Sc ends, either into C or into R; between C and Sc two cross veins. In the hindwing Sc is very short and ends into C. One cross vein between Sc and C, and one between R and C. The area between R^4 and R^5 in both pairs of wings divided by a cross vein into two cells.

Genotype : *N. dipteroïdes*.

[**N. dipteroïdes** Till.] (fig. 115, 116, 117).

Nannochorista dipteroïdes TILLYARD, Proc. Linn. Soc. N. S. W., p. 293, pl. XVI, fig. 1 (1917).



FIG. 115. — *Nannochorista dipteroïdes* ♀
Right fore- and hindwing
(Coll. Esben-Petersen).

Vertex, face and rostrum pale brown; ocelli placed in a large blackish spot. Antennae blackish; basal

joint robust, second joint large, both joints brownish. Thorax and abdomen blackish, shining and with short

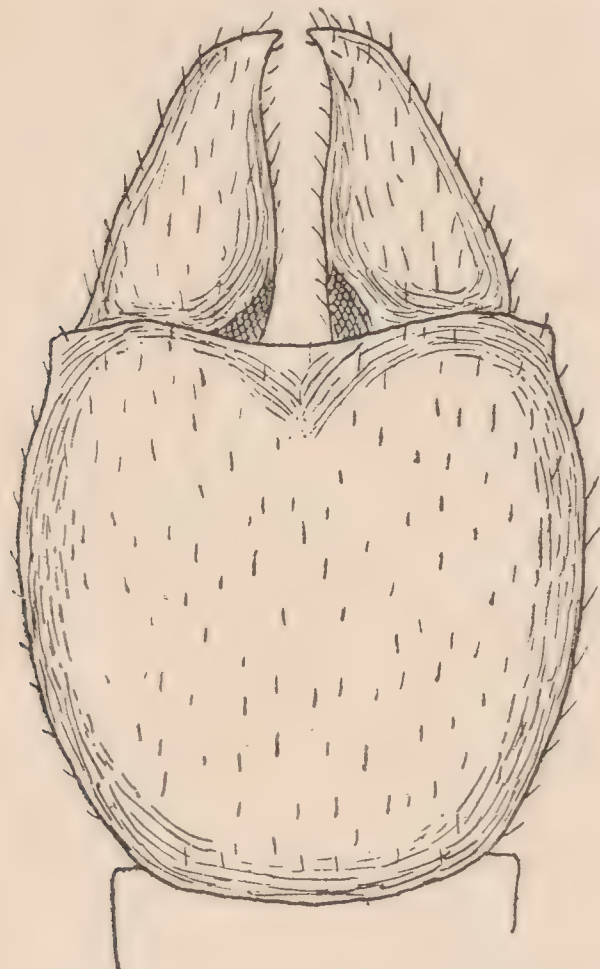


FIG. 116. — *Nannochorista dipteroïdes* ♂
Dorsal view of terminal segment
(Coll. Esben-Petersen).

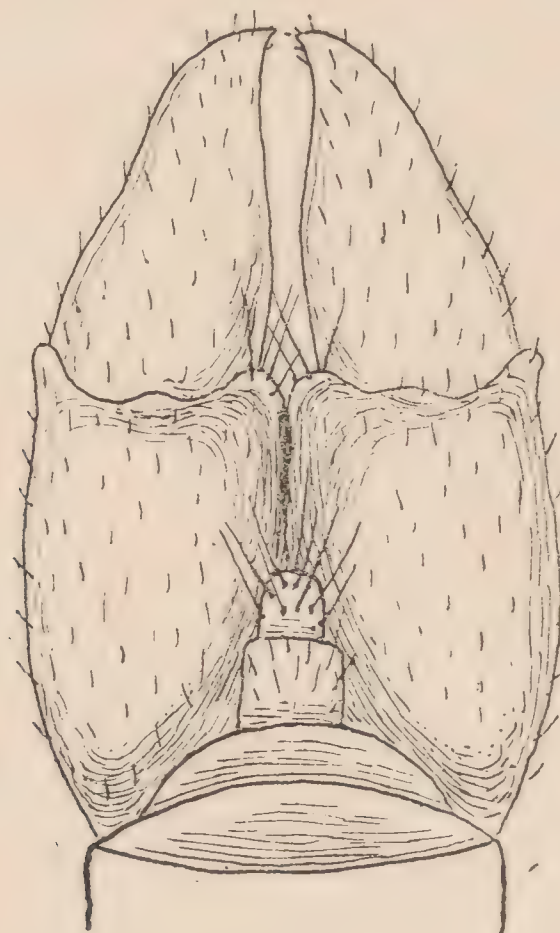


FIG. 117. — *Nannochorista dipteroïdes* ♂
Ventral view of terminal segment
(Coll. Esben-Petersen).

yellowish pubescence. Anal appendages of male yellowish brown. Legs yellowish brown, slightly darker at the apex of femora, tibiae and tarsal joints.

Forewing : 6,5-8,5^{mm}; hindwing : 5,5-7,5^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 2 ♂, 1 ♀ Cradle Mount., Tasmania (ex coll. TILLYARD).

[*N. holostigma* Till.]

Nannochorista holostigma TILLYARD, Proc. Linn. Soc. N. S. W., p. 294, pl. XVI, fig. 2 (1917).

TILLYARD, *loc. cit.* :

« Closely resembles *N. dipteroïdes*, from which, however, it may be at once distinguished as follows : In forewing, Sc ends up on C, not on R¹, and the pterostigma is completely closed proximally by a small cross vein descending from Sc to R¹. Wings slightly broader and generally somewhat less hyaline than in *N. dipteroïdes*; most of the cross veins in the forewing usually distinctly clouded. Legs with a black spot on each trochanter, a black blotch distally on each femur. Segments 9-10 and claspers of ♂ rich red-brown, larger than in *N. dipteroïdes*. Cerci of ♀ as in text-fig. 2b.

Forewing : ♂ 6, ♀ 7-8,5^{mm}; hindwing : ♂ 5,2, ♀ 6-7,5^{mm}.

Habitat. — Shores of Lakes Lilla and Dove, Cradle Mountain, N. W. Tasmania (3,000 feet). Also a few specimens from bushes overhanging the creeks. January 1917 ».

Coll. SELYS : not present.

[*N. maculipennis* Till.]

Nannochorista maculipennis TILLYARD, Proc. Linn. Soc. N. S. W., p. 294, pl. XVI, fig. 3 (1917).

TILLYARD, *loc. cit.* :

« This very distinct species differs from *N. dipteroïdes* as follows : Head intirely black; antennae 2,7^{mm}, 22-jointed, black, third joint not much elongated. Thorax and abdomen : 1-8 jet black, 9-10 and claspers dark brown, large, blunter than in *N. dipteroïdes*, somewhat hairy. Wings distinctly shorter and more rounded

at apices than in the other species; forewing heavily clouded with greyish-black upon all the cross-veins and junctions of the veins, as shown in plate XVI, figure 3. Hindwing with cross-veins near middle of wing lightly clouded.

Forewing : 5,5^{mm}; hindwing : 4,7^{mm}.

Habitat. — Crater Lake Creek, Cradle Mountain, N. W. Tasmania (3,500 feet). A single male, beaten out of a bush by M. G. H. HARDY, January 16th 1917 ».

Coll. SELYS : not present.

[**N. eboraca** Till.]

Nannochorista eboraca TILLYARD, Proc. Linn. Soc. N. S. W., p. 295, pl. XVI, fig. 4 (1917).

TILLYARD, *loc. cit.* :

« Head reddish-brown, vertex and ocelli shining black; antennae 4^{mm}, scape and pedicel reddish-brown, rest black, third joint long. Eyes black; mouth-parts blackish. Thorax dark shining brown. Legs very slender, semi-transparent pale brownish, tarsi somewhat darker. Wings rather elongated, slightly clouded as shown in plate XVI, figure 4. Abdomen very dark shining brown. Cerci with slender elongated third joint, as shown in text-figure 2c. Closely resembles *N. dipteroïdes* ♀, but can be distinguished from it at once by the form of the cerci.

Forewing : 7,5^{mm}; hindwing : 6,5^{mm}.

Habitat. — Ebor Scrub, N. S. W. (5,000 feet). A single female taken by Dr. A. J. TURNER, on January 11th 1916 ».

Coll. SELYS : not present.

Genus **CHORISTELLA** Tillyard (1917).

TILLYARD, Proc. Linn. Soc. N. S. W., p. 298 (1917).

Wings rather short and broad; hindwing shorter than the forewing. In the forewing Sc ends into R, not far from pterostigma. Two cross veins between C and Sc. Sc in the hindwing very short; one cross vein between C and Sc. The area between R⁴ and R⁵ in both pairs of wings not divided into two cells by a cross vein.

Genotype : *Ch. Philpotti*.

[**Ch. Philpotti** Till.]

Choristella Philpotti TILLYARD, Proc. Linn. Soc. N. S. W., p. 299, fig. 3 (1917).

TILLYARD, *loc. cit.* :

« Head brown; eyes and antennae dark brown. Thorax blackish. Legs brown, with darker femora. Wings hyaline, the forewing marked all over with semi-transparent blotches of dull brownish, as shown at text-figure 3; hindwing slightly clouded with brown at the points of union of the veins with the apical and posterior margins, and upon the cross-veins. Frenulum well-developed, with two strong bristles in the male, and a third somewhat shorter bristle also present in the female. Abdomen cylindrical, shiny black with pale pubescence. Segment 9 and anal appendages brown, the latter shaped very much as in *Nannochorista maculipennis*.

Forewing : ♂ 6, ♀ 8,5^{mm}; hindwing : ♂ 5,3, ♀ 7,5^{mm}.

Habitat. — South Island of New Zealand.

FAM. MEROPIDAE.

The costal area in the forewing very broad, with simple cross veins at both ends and often with irregular cellules in the middle part. Sc joins the costa a little before the pterostigmatal region. Between costa and R one cross vein just before the pterostigma, and between Sc and R several in both wings. R^2 and M^4 are forked in fore- and hindwing. Fm near the base of the wings. In the hindwing Cu^1 fuses with M for a short distance very close to the base. 3A very short. Between 1A and 2A one cross vein. In the hindwing Cu^2 and 1A coalesce at the base for a short distance. Wings narrow at the base and very broadened towards the tip, which is broadly rounded. Venation regular. No ocelli.

This family may be looked upon as an old one, specialized in a way differing very much from the common Panorpid-type.

Genus **MEROPE** Newman (1838).

Merope NEWMAN, The Entomologist' Mag., V, p. 180 (1838). — WESTWOOD, Trans. Ent. Soc. London, IV, p. 194, pl. 14, fig. 2 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 196 (1853). — HAGEN, Syn. Neur. N. A., p. 248 (1861). — BRAUER, Verh. zool.-bot. Ges., p. 413 (1868). — BANKS, Trans. Am. Ent. Soc., XIX, p. 338 (1892). — HINE, Bull. Sci. Lab. Denyson Univ., p. 262 (1901). — ENDERLEIN, Zool. Anz., XXXV, p. 394 (1910).

Rostrum short and narrowed towards apex. Eyes reniform and nearly touching each other above the antennae. Antennae short and almost fusiform. Wings near the base posteriorly with a short lunate prolongation, rather chitinated and strongly haired. Claws not serrate. In the ♂ is found a pair of large claspers. The dorsal prolongation of 9th segment is cleft, but the ventral is narrowed towards apex, which is truncate.

The genus is restricted to the eastern part of United States.

M. tuber Newman (plate II, fig. 20).

Merope tuber NEWMAN, The Ent. Mag., V, p. 180 (1838). — WESTWOOD, Trans. Ent. Soc. London, IV, p. 194, pl. 14, fig. 2 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 196 (1853). — HAGEN, Syn. Neur. N. A., p. 248 (1861). — SELYS, Ann. Soc. Ent. Belg., XIII (Compt. rend., pp. 30-31 (1869-1870)). — HINE, Bull. Sci. Lab. Denyson Univ., p. 263 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907). — ENDERLEIN, Zool. Anz., XXXV, p. 394 (1910). — TILLYARD, Proc. Linn. Soc. N. S. W., p. 599, fig. 61 (1919).

Head, body and legs luteous. Rostrum at the tip slightly brownish. Antennae luteous, brownish in the middle. Basal joint stout, broader than long; 2nd joint much smaller, globular; 3rd joint as broad as long, very narrow at the base; the 4th and following broader than long; 6th to 12th stoutest, the rest of joints becoming gradually smaller. Pro- and mesothorax dorsally brown. Abdomen flattened. Wings hyaline with a faint yellowish grey tinge. Longitudinal veins testaceous; the cross veins in the apical part of wings indistinct, whitish. Legs short; the hind legs hardly as long as the forewing.

In the ♂ the two-jointed claspers are very large. Basal joint somewhat flattened; the chelae cylindrical, narrowed towards the apex; the tip dilated and incurved.

In the ♀ the abdomen is narrowed towards the apex and the subgenital plate with a longitudinal median carina.

Length of forewing : 11^{mm}; hindwing : 10^{mm}.

Coll. SELYS : 1 ♂, 1 ♀ New-York (BREYER). — Mus. Brux : 1 ♂.

FAM. NOTIOTHAUMIDAE.

Reticulation very dense. Costal area in both pairs of wings very broad, the number of rows of cellules not exceeding 6 in the forewing and 2 in the hindwing. Sc runs parallel to the costa; it ends in the pterostigmatical area, which has no cross veins. R and M coalesce at the base of wing for about one fifth of its length. M forks in the forewing about one third from base; Fm indicated by a clear spot. In the hindwing M forks about one fifth from base. Cu¹ fuses with M at a point close to the base. The space between Cu¹ and Cu² in the forewing occupied by a great number of irregular cellules, in the hindwing is found only one row of regular, subquadrate cellules. The areas between 1A, 2A and 3A occupied by irregular, hexagonal cellules. The furcation of Rs and M in the distal part of wings is hardly noticeable on account of the irregularity in the dense venation. Ocelli present.

This family may be regarded as a very archaic one, in which the specialization by addition of veins has taken place in a more extensive degree than in any other group within the *Mecoptera*.

Genus **NOTIOTHAUMA** Mac Lachlan (1877).

Notiothauma MAC LACHLAN, Trans. Ent. Soc. London, IV, p. 427, pl. 10, fig. A1-5 (1877).
— ENDERLEIN, Zool. Anz., XXXV, p. 395 (1910). — TILLYARD, Proc. Linn. Soc. N. S. W., p. 603 (1917).

Rostrum long, slightly narrowed towards apex. Eyes reniform, wide apart above the antennae. Ocelli small. Vertex much raised. Antennae long and slender. Maxillary palpi with a short basal joint, the 2nd joint long, curved, dilated gradually towards the tip, 3rd also dilated, but stouter and shorter, 4th and 5th short, the latter obtuse. Prothorax twice broader than long, with a row of long erect spines along the front margin and with two transversely placed tubercles about in the middle of the dorsum, each provided with 3 erect spines. Meso- and metathorax flattened; the first with two transversely placed groups of erect spines near to the front margin. The abdomen somewhat depressed. Legs long and slender, femora and tibiae provided with a number of spines. Wings equal, broad, with broadly rounded tips and with well developed lobes (clavi) at the extreme base. At the base of forewings all the longitudinal veins are provided with erect spines. The claws not serrate.

[**N. Reedi** Mac Lachl.] (fig. 118, 119).

Notiothauma Reedi MAC LACHLAN, Trans. Ent. Soc. London, IV, p. 427, pl. 10A, fig. 1-5 (1877) (Chile). — ENDERLEIN, Zool. Anz., XXXV, p. 395 (1910).

Head and body dark castaneous. Rostrum with a paler median streak. Antennae castaneous, strongly pilose. Basal joint rather long and stout, 2nd joint yellowish brown, shorter and thinner, 3rd and 4th very

short, as broad as long; the succeeding joints longer. The dorsum of thorax and abdomen paler than the venter. Abdomen much shorter than the wings; the apex pointed and with a pair of two-jointed cerci. Wings

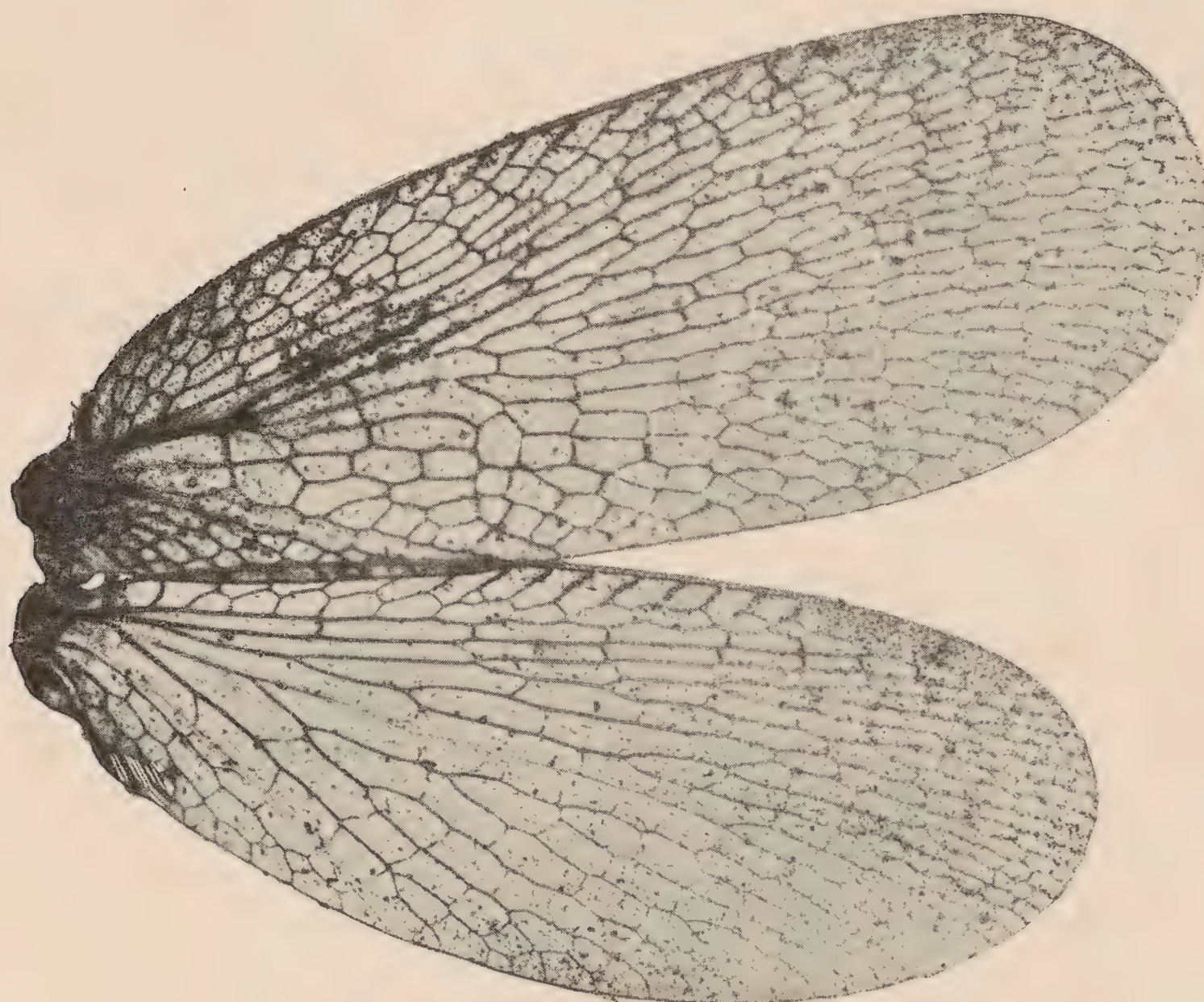


FIG. 118. — *Notiothauma Reedi* ♀
(Museum Hamburg).

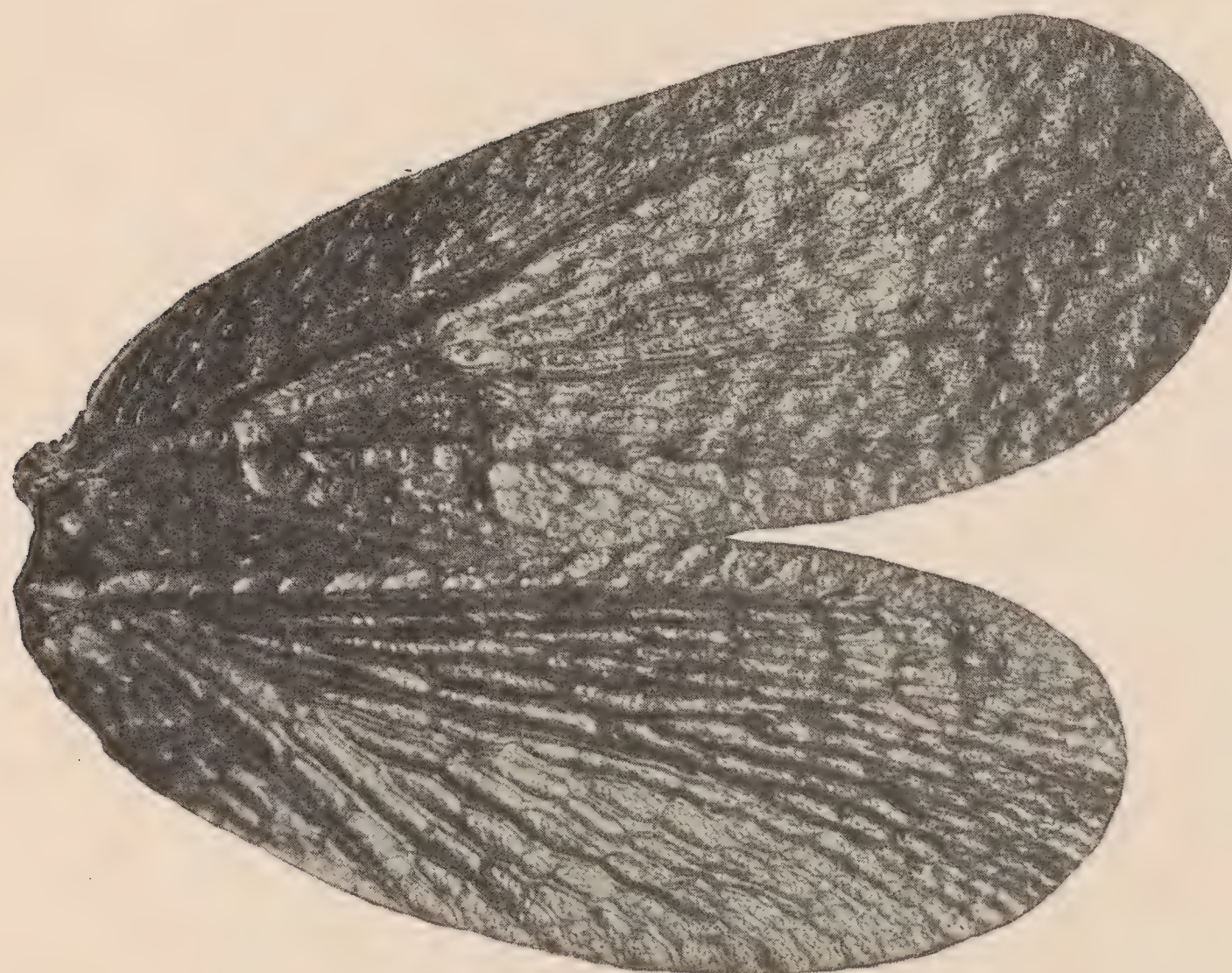


FIG. 119. — *Notiothauma Reedi* ♀
(Museum Hamburg).

with yellowish grey tinge and with a somewhat coriaceous appearance. Posterior wings a little paler. Venation yellowish brown, distinctly. Pterostigma indistinct, yellowish.

Length of forewing : 26^{mm}; hindwing : 22,5^{mm}.

Coll. SELYS : not present. — Mus. Hamburg : 1 ♀, Kom. Magalhaen's Sammelreise. Valdivia (v. Losberg leg.).

The male of the species is still unknown. MAC LACHLAN described the species from a damaged female specimen from Chile (present in MAC LACHLAN's collection).

FAM. BOREIDAE.

Boreidae MAC LACHLAN, Trans. Ent. Soc. London, p. 218 (1868).

Rostrum long; mandibles with several teeth at the apex internally; maxillary palpi 5-jointed, the basal joint the shortest, the apical one the longest; labial palpi very short, 2-jointed, the apical minute. Eyes large, oval; ocelli absent. Abdomen short and stout. Legs slender, cylindrical; first tarsal joint very long; two simple and slender claws, not serrate. Wings rudimentary; in the male four, slender, bristle-like and curved; the fore pair somewhat coriaceous, serrated internally and with a long and strong bristle at the apex; the hind pair membraneous and with bristles on the inner margin apically; in the female only the fore pair is present, and they have the form of a small scale-like lobe on each side of the mesothorax. First abdominal segment very short, hidden by the prolongation of the hind border of metathorax. In the male the hind margin of 9th segment is prolonged ventrally into a triangular plate (lower appendage), and dorsally the same segment is produced into an arched plate (upper appendage), the apex of which is truncate. Between these two appendages is inserted a pair of two-jointed claspers. The basal joint stout; the apical one slender and movable against the dorsum of the abdomen; its apex either deeply cleft and the branches sharply pointed, or not cleft, and then only terminating in one sharp point. In the female the 9th segment is divided into a short dorsal part and two very long, ventrally placed valves. The dorsal part of 10th segment forms together with the valves the basal part of the ovipositor, the tip of which is formed by the modified anal valves.

Only one genus is known.

Genus **BOREUS** Latr. (1825).

Boreus LATREILLE, Cuv. Règne Anim., V, p. 247 (1825). — KLUG, Abh. Königl. Akad. Wiss. Berl., p. 88 (1836). — BURMEISTER, Handb. Ent., II, p. 955 (1839). — RAMBUR, Hist. nat. Ins. Névr., p. 328 (1842). — FITCH, Amer. Journ. Agric., V, p. 278 (1847). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 455 (1853). — BRAUER, Verh. zool.-bot. Ges., p. 711 (1855). — BRAUER und LÖW, Neur. austr., p. 35 (1857). — HAGEN, Syn. Neur. Ins. N. A., p. 240 (1861). — ID., Ent. Monthl. Mag., p. 132 (1866). — MAC LACHLAN, Trans. Ent. Soc. London, p. 219 (1868). — WALLENGREN, Svenska Vet. Akad. Handl., p. 73 (1871). — ROSTOCK, Neur. Germ., p. 117 (1888). — KLAPÁLEK, Rozp. Cesk. Akad. Cisare Frantis. Josefa, p. 21 (1896). — HINE, Bull. Sci. Lab. Denison Univ., XI, p. 255 (1901). — ESBEN-PETERSEN, Ent. Medd. Köbenh., p. 48 (1906). — MJÖBERG, Ent. Tidskr. Stockh., p. 162 (1909). — ENDERLEIN, Zool. Anz., XXXV, p. 389 (1910).

The species are found partly in Europe and partly in North America. The North American species may be easily separated from the European species as to the male sex by the absence of the elevations on the dorsum of 2nd and 3rd abdominal segment, and as far as I can see also by the absence of the inner tooth of the terminal segment of the claspers. It may be remarked that little attention must be paid to the differences in colour, as the colour varies immensely, according to the degree of maturity of the individual.

Type : *B. hyemalis*.

Eurasian species.

B. hyemalis L. (fig. 120).

Panorpa hyemalis LINNÉ, Syst. nat., XII, p. 915 (1767). — FABRICIUS, Syst. Ent., p. 314 (1775).

Bittacus hyemalis LATREILLE, Hist. nat. Crust. Ins., XIII, p. 20 (1805).

Boreus hyemalis LATREILLE, Cuv. Règne Anim., V, p. 247 (1825). — KLUG, Abh. Kön. Akad. Wiss. Berl., p. 107 (1839). — MAC LACHLAN, Trans. Ent. Soc. London, p. 219 (1868). — ID., ibid., p. 399 (1869). — WALLENGREN, Svenska Vetensk. Akad. Handl., IX, p. 73 (1871). — SCHÖYEN, Christ Vidensk. Forh., XIII, p. 13 (sep.) (1887) (Norway). — ALBARDA, Cat. rais. syn. Névr., p. 115 (1889) (Belgique). — MONTANDON, Bull. Soc. Scienc. Bucarest, p. 679 (1906). — WEELE, Tijdschr. v. Ent., p. 127 (1907) (Holland). — LUCAS, Entomologist, XLIII, p. 188, pl. IV, fig. 4 (1910) (England).

Boreus hiemalis BURMEISTER, Handb. Ent., II, p. 955 (1839). — RAMBUR, Hist. nat. Ins. Névr., p. 328 (1842). — BRAUER, Verh. zool.-bot. Ges., V, p. 10, pl. III (1855). — BRAUER et LÖW, Neur. austr., p. 35 (1857). — HAGEN, Ent. Monthl. Mag., p. 132 (1866). — MEYER-DÜR, Mitth. Schweiz. ent. Ges., IV, p. 360 (1874). — ROSTOCK, Neur. germ., p. 117 (1888). — KLAPÁLEK, Rozp. Cesk. Akad. Cisare Frantis. Josefa, p. 21, pl. I, fig. 6 (1896). — HEYDEN, Ber. Senck. Nat. Ges. Frankf. a. M., p. 112. — ESBEN-PETERSEN, Ent. Medd. Köbenhavn, III, p. 48 (1906) (Denmark). — MJÖBERG, Ent. Tidskr. Stockholm, p. 162, fig. 51 (1909).

Gryllus proboscideus PANZER, Faun. Germ., XXVII, p. 18 (1796).

Ateleptera hyemalis DALMAN, Anal., p. 34 (1823).

Boreus gigas BRAUER, Die Neur. Europas, p. 17 (1876) (nom. nud.).

Head shining dark bronzy-brown; rostrum brown, tip darker. The basal half of antennae brown, the apical half blackish. Front glabrous, scattered punctuate, hardly rugose. Prothorax

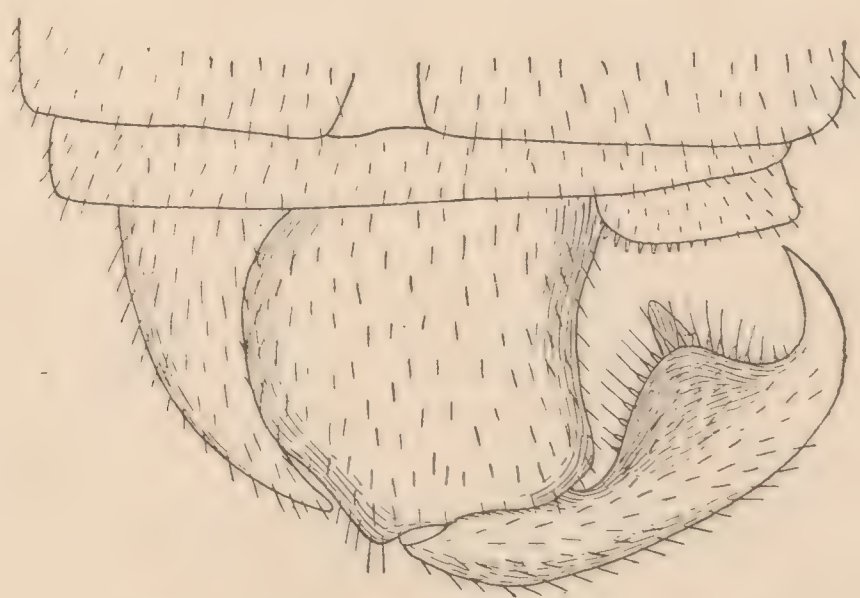


FIG. 120. — *Boreus hyemalis* ♂
Lateral view of anal appendages.
(Coll. Esben-Petersen).

dark bronzy-brown; meso- and metathorax brown. Abdomen shining dark bronzy-brown. Legs yellowish brown, their articulations blackish. Wings of male and rudiments of wings in the female brown. Ovipositor in the female and apical joint of the claspers in the male brown. In the male the dorsum of 2nd abdominal segment bears a rectangular, raised lobe, the lateral edges of which are directed outwards. On the succeeding segment is found an indication of a

similar lobe, but smaller and very indistinct. The lower appendage triangular, the sides slightly rounded, and the apex somewhat produced and elliptical. In the female the dorsal part of ninth segment is about ten times shorter than the valves.

Length of body ♂ 3-4^{mm}; ♀ (with ovipositor) 4,5-5^{mm}.

Coll. SELYS (general collection) : 1 ♂ (ex coll. GUÉRIN); 1 ♀ (ex coll. LATREILLE); 1 ♂, 2 ♀; (Belgian collection) : 2 ♂, 3 ♀. — Mus. Stockholm : 1 ♂, 3 ♀ [Mus. Payk.]; 1 ♂, 3 ♀ (no labels). — Mus. Vienna : 1 ♂ [Winthem] [*hiemalis* KLAPÁLEK] [coll. BRAUER]. — Coll. ESBEN-PETERSEN : 6 ♂, 1 ♀ Denmark; 1 ♀ Silesia; 1 ♂ Edinburgh (ex coll. MORTON).

As to *B. gigas* it may be noticed that this name is a catalogue name only, used by BRAUER, *loc. cit.*, for two specimens (♂ ♀) from Harz. I have not seen the specimens, but KLAPÁLEK has examined them, and in Rozpr. Ceske Akad., X, p. 9 (1901), he gives a description of the specimens, in which he says « Both specimens are very near, or truly identical with *B. hiemalis*. The abnormal size makes them conspicuous ».

[**B. Lokayi** Klap.] (fig. 121).

Boreus Lokayi KLAPÁLEK, Bull. Int. Acad. Sci. Bohême, p. 6, fig. 7 (1901).

? *Boreus tarnanii* NAVÁS, Revue Russe d'Entom., XI, p. 277, fig. 1 (1911) (Polonia).

Head shining bronzy-brown; rostrum and maxillary palpi yellowish brown; antennae yellowish, towards apex a little darker. Vertex punctuate, front transversely rugose. Prothorax pale bronzy-brown with yellowish margins. Meso- and metathorax yellowish brown to pale bronzy-brown. Abdomen dorsally shining pale

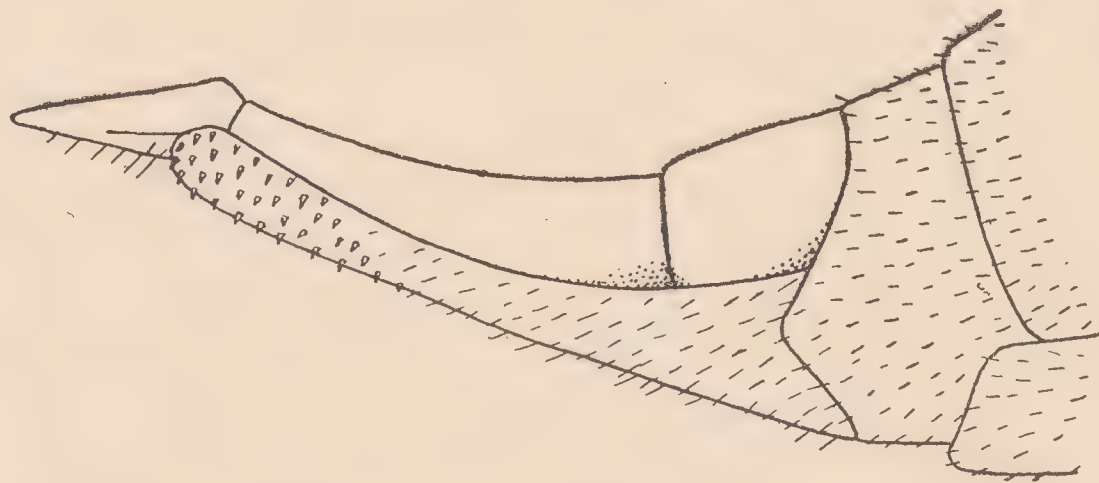


FIG. 121. — *Boreus Lokayi* ♀
Apical part of abdomen
(Coll. Klapálek).

bronzy-brown, ventrally paler. Anal appendages of male and ovipositor of female yellowish. Legs yellowish, articulations a little darker. Wings of male and rudiments of wings in female yellowish. In the male the dorsum of 2nd abdominal segment bears a transversely placed, rectangular raised lobe, the lateral edges of which are directed outwards. On the 3rd segment is found a similar, but very small one. Lower appendage triangular with straight side margins; tip truncate. In the female the dorsal part of 9th segment is 5 to 6 times shorter than the valves.

Length of body ♂ 3,5^{mm}; ♀ 4,5^{mm}.

Coll. SELYS : not present. — Coll. KLAPÁLEK : 1 ♂, 1 ♀ Buczecs, Transsylvania (LOKAY leg.).

The two specimens before me are probably small ones, as KLAPÁLEK mentions that the species is larger than *B. Westwoodi*. The species is similar to *B. Westwoodi* as to the pale colour and the rugosity of the front; the males, however, may easily be separated by the different shape of the lobes on the dorsum of 3rd abdominal segment.

It is with some hesitation that I refer *B. Tarnanii* to this species, but as NAVÁS considers it to be dissimilar to *B. Boldyrevi*, which is a synonym to *B. Westwoodi*, I think I may be right. It is quite sure that the female described as *B. Tarnanii* may be referred either to *B. Lokayi* or to *B. Westwoodi*.

B. Westwoodi Hagen (fig. 122, 123).

Boreus Westwoodi HAGEN, Ent. Monthl. Mag., III, p. 132 (1866). — MAC LACHLAN, Trans.

Ent. Soc. London, p. 399, fig. 2 (1869). — ROSTOCK, Neur. germ., p. 117 (1888).

Boreus boldyrevi NAVÁS, Revue Russe d'Entom., XI, p. 278, fig. 2a, 2b, 2c (1911) (Moskwa).

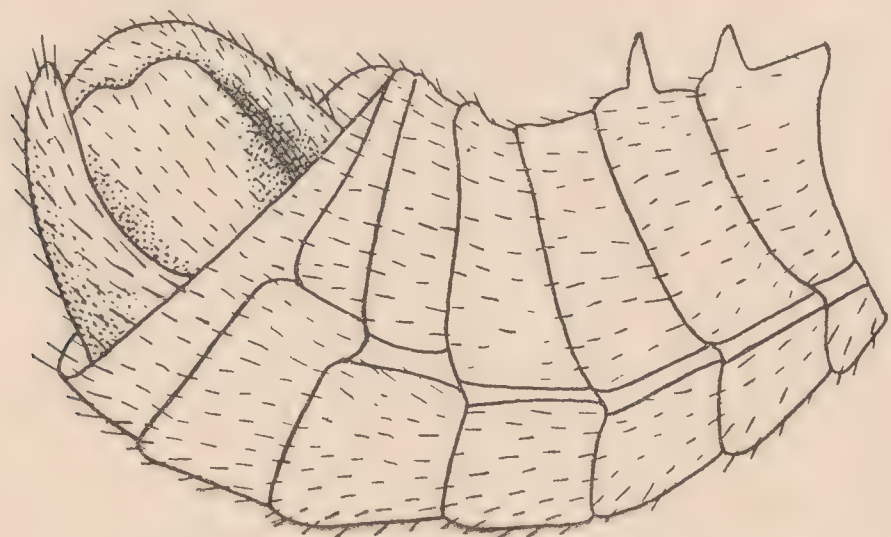


FIG. 122. — *Boreus Westwoodi* ♂
Apical part of abdomen
(Museum Stockholm).

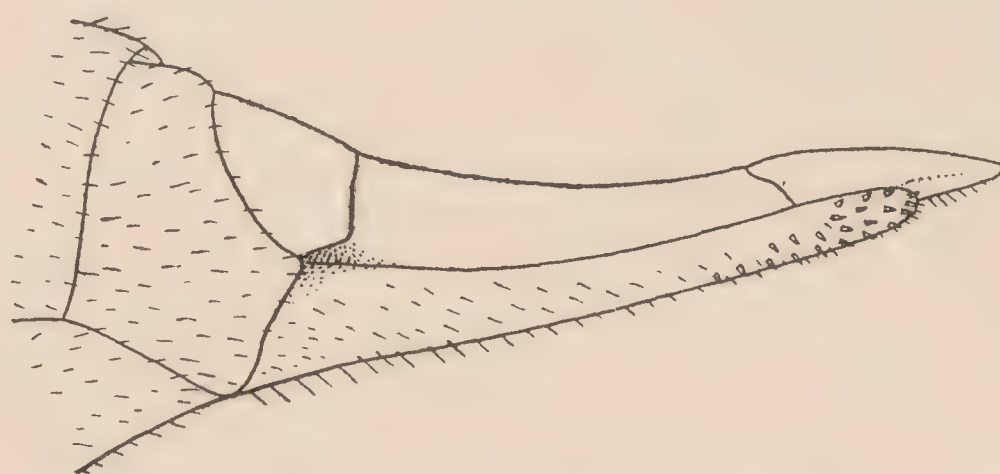


FIG. 123. — *Boreus Westwoodi* ♀
Apical part of abdomen
(Museum Stockholm).

Head shining bronzy-brown; rostrum yellow, the base a little darker and the tip brown; maxillary palpi yellow, tip of apical joint brownish. Antennae yellow, apical part pale brown. Vertex scattered punctuate; front transversely rugose. Prothorax pale bronzy-brown, front and hind margins narrowly yellow; meso- and metathorax yellowish brown. Abdomen shining bronzy-brown. Anal appendage of male and ovipositor of female yellowish. Legs yellowish, articulations pale brown. Wings of male and rudiments of wings in female yellowish. In the male the dorsum of 2nd abdominal segment bears a transversely placed, rectangular, raised lobe, the lateral edges of which are directed outwards. On 3rd segment a lobe of the same shape and size, but hardly as long. The lower appendage of the male triangular, the sides slightly incurved, and the tip truncate.

Length of body ♂ 3-3,5^{mm}; ♀ 4-4,5^{mm}.

Coll. SELYS : 1 ♂ (ex coll. GUÉRIN). — Mus. Stockholm : 1 ♂, 1 ♀ Helsingfors (SAHLBERG leg.); 1 ♀ [Schh.]; 1 ♀ [Mus. PAYK.]. — Mus. Copenhagen : 1 ♀ [Mortensnäs, Nordvi.].

[B. Navasi Pliginsky].

Boreus Navasi PLIGINSKY, Revue Russe d'Entom., XIV, p. 364, fig. 1-8 (1914).

PLIGINSKY, *loc. cit.* :

« Dark-green, almost black, metallic shining. Rostrum yellowish, darker towards apex. First joint of palpi brownish yellow, the remainder blackish. Eyes elliptical, yellowish. Antennae 20-jointed, blackish and clothed with whitish hairs; basal joint robust, as long as broad; second joint somewhat longer than broad; third joint oblong, half as broad as second; 4th-8th cylindrical, trice as long as broad; 9th-11th somewhat stouter and shorter than 8th; 11th-19th somewhat longer than broad; 20th joint elliptical. Prothorax narrowed in front, blackish and coarsely striated transversely; in the male sex the hind part of prothorax is brownish yellow. Mesothorax broad, trapezoidal, punctuated and not so coarsely striated transversely as the prothorax; in the centre a transversely placed groove. Metathorax broader and shorter than the mesothorax, with a transversely placed groove in its centre and with a deep semi-lunar incision posteriorly. Abdomen black, greenish metallic shining and finely rugosed transversely; in the male sex the abdomen is clothed with short white hairs; in the female sex it is naked. Legs tiny, yellowish; tarsi blackish.

♂. Wings (fig. 2) yellowish, reaching the third abdominal segment. Forewing curved, darker at apex, shining, punctuate, and finely rugose and haired dorsally; coarsely haired ventrally. Hindwings narrower and shorter than forewings; densely haired ventrally. Tip of the wings with a claw-like prolongation. No elevations on second and third abdominal segments. Subgenital plate brownish yellow, very thin, punctuated downwardly and finely haired. The plate narrowly incised laterally.

Length : 2,5^{mm}; breadth : 1^{mm}.

♀. Forewings (figs. 5 and 6) very small; hindwings have the shape of very small and narrow plates. All the wings yellowish coloured. Ovipositor blackish, curved (fig. 8).

Length incl. the ovipositor : 3^{mm}. breadth : 0,75^{mm}.

Das ♀ dieser Art unterscheidet sich von allen bis jetzt bekannten Arten durch die winzigen Vorderflügel und durch die Gestalt des Legerohres, welches unter einem fast geraden Winkel gekrümmt ist.

Umgegend von Sevastopol, 3 ♂ und 1 ♀ in meiner Sammlung. »

Coll. SELYS : not present.

This species as well as the two following are unknown to me, and I do not like to say anything about them. Their descriptions are given in the Russian language with a very short resumé in German. By the kind assistance of RICH. FREY, Helsingfors Museum, I have been able to give a translation of the descriptions.

[**B. chadzhi-gireji** Pliginsky].

Boreus chadzhi-gireji PLIGINSKY, Revue Russe d'Entom., XIV, p. 366, fig. 9-13 (1914).

PLIGINSKY, *loc. cit.* :

« ♀. Shining; dark greenish metallic coloured or partly purplish shining. Rostrum yellowish brown, darker at the tip. Palpi blackish. Eyes elliptical, yellowish. Head between the eyes evenly punctate. Antennae 19-jointed, blackish; 1st joint large and robust; 2nd globular, half as broad as 1st, and twice as long as broad; 3rd joint small, cylindrical, half as broad as 2nd, and twice as long as broad; 4th joint longer than 3rd; 5th-10th long, cylindrical, 11th-18th cylindrical, somewhat longer than broad; 19th joint elliptical; all the joints clothed with very short blackish and whitish hairs. Prothorax as long as broad, narrowed in front, and finely rugosed transversely. Mesothorax as broad as hind margin of prothorax, with parallel lateral margins and somewhat incised posterior margin. Metathorax broad, with a semi-lunar incision posteriorly and with a transversely placed groove in its centre. Wings yellowish; forewings (fig. 10 and 11) oblong and punctate; hindwings have the shape of small narrow plates. Abdomen evenly clothed with short whitish hairs, transversely rugose. Ovipositor almost straight (fig. 13). Legs slender, yellowish, whitish haired; tarsi somewhat darker.

Length : 3^{mm}; breadth : 0,75^{mm}.

♂. The male only differs from that of *B. Navasi* in possessing 19-jointed antennae.

Das ♀ dieser Art unterscheidet sich von den anderen Arten der Gattung durch ein ganz gerades Legerohr und durch die Gestalt der Vorderflügel, welche stark verlängert und verhältnismässig gross sind. Das ♂ unterscheidet sich von *B. Navasi* durch seine 19-gliedrigen Fühler.

Umgegend von Sevastopol und Simferopol, 2 ♀ in meiner Sammlung; Eupatoria, 5 ♂ und 14 ♀ in der Sammlung des Zoologischen Museum der Akademie der Wissenschaften und in meiner Sammlung. »

Coll. SELYS : not present

[**B. aktijari** Pliginsky].

Boreus aktijari PLIGINSKY, Revue Russe d'Entom., XIV, p. 367, fig. 14 (1914).

PLIGINSKY, *loc. cit.* :

« ♀. Bronze-coloured. Rostrum towards apex yellowish. Antennae 19-jointed. Abdomen almost smooth, not glossy, without visible rugosity, but with yellowish lateral margins. Hind margin of the abdominal segments ventrally yellowish. The posterior half part of the segments whitish haired. Forewings (fig. 14) small and with rounded apex. The species has great likeness to *B. chadzhi-gireji* ♀.

Length : 3,5^{mm}; breadth : 0,75^{mm}.

Unterscheidet sich von *B. chadzhi-gireji* durch ihren bronzefarbenen Körper, das glatte, fast ganzlich matte Abdomen ohne merkliche Querrunzelung, die abgerundeten Vorderflügel und die gelbfarbigen Seiten des Bauches.

Umgegend von Sevastopol, 1 ♀ in meiner Sammlung. »

Coll. SELYS : not present.

American species.**B. nivoriundus** Fitch (fig. 124).

Boreus nivoriundus FITCH, Am. Journ. Agr., V, p. 277 (1847). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 456 (1853). — HAGEN, Syn. Neur. N. A., p. 240 (1861). — HINE, Bull. Sc. Lab. Denison Univ., XI, p. 254 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head shining bronzy-brown; rostrum yellowish brown, darker at base. Maxillary palpi yellowish brown, apical joint darker towards tip. Antennae pale brown in the basal half, darker towards apex; vertex coarsely punctuate; front finely reticulated. Prothorax dark reddish brown. Abdomen shining bronzy-brown. Anal appendages of male and ovipositor of

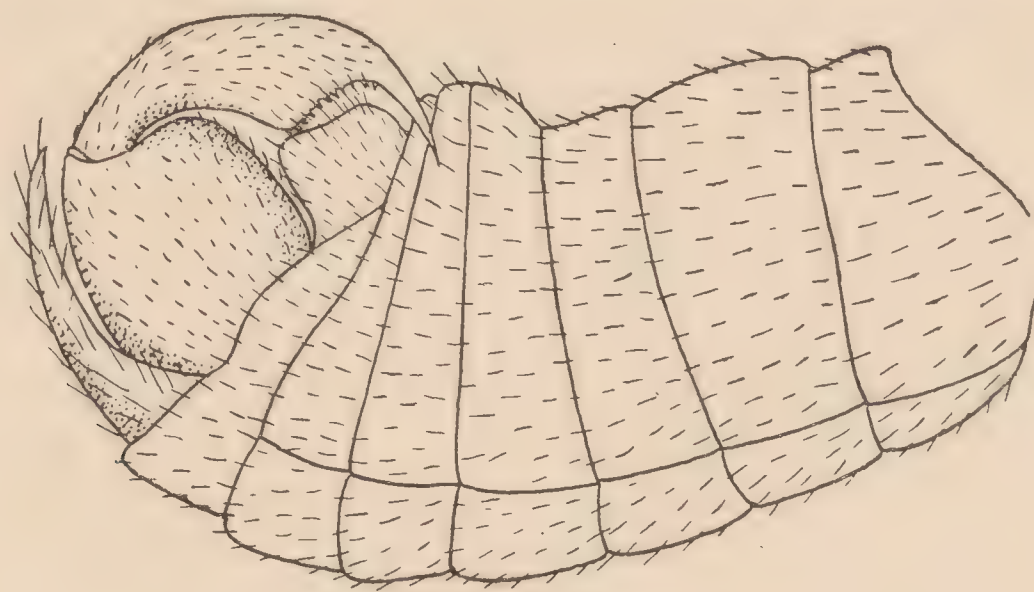


FIG. 124. — *Boreus nivoriundus* ♂
Apical part of abdomen
(Coll. Selys).

female pale brown. Legs yellowish brown; tip of tibiae and of tarsal joints brown. Wings of male and rudimentary wings of female yellowish brown to brown. Ovipositor of female short, about half as long as the abdomen. In the male the lower appendage triangular with straight lateral margins and broadly rounded apex.

Length of body : ♂ 3,5^{mm}; ♀ 4,5^{mm}.

Coll. SELYS : 3 ♂, 2 ♀. A female is labelled [*B. nivoriundus* FITCH] in the handwriting of H. A. HAGEN.

B. brumalis Fitch (plate II, fig. 24).

Boreus brumalis FITCH, Am. Journ. Agr., V, p. 278 (1847). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 456 (1853). — HAGEN, Syn. Neur. N. A., p. 240 (1861). — HINE, Bull. Sci. Lab. Denison Univ., XI, p. 255 (1901). — BANKS, Cat. Neur., Ins. U. S., p. 34 (1907).

Wings shining metallic black; rostrum and maxillary palpi pitchy brown; antennae brown in the basal half, blackish brown towards apex; vertex sparingly punctuate; front finely reticulate. Thorax and abdomen shining metallic black. Anal appendages of male and ovipositor of female pitchy black. Legs pitchy brown. Wings of male and rudimentary wings of female brown. Ovipositor of the female short, about half as long as the body. In the male the lower appendage is triangular with straight lateral margins, and the truncate apex deeply emarginate.

Length of body : ♂ 2,5^{mm}; ♀ 4^{mm}.

Coll. SELYS : 3 ♂, 2 ♀. A male is labelled [*B. brumalis* FITCH] in the handwriting of H. A. HAGEN. — Coll. ESBEN-PETERSEN : 2 ♂ Sea Cliff, N. Y. (ex coll. BANKS).

[*B. californicus* Pack.].

Boreus californicus PACKARD, Proc. Bost. Soc. Nat. Hist., VIII, p. 408 (1871). — HINE, Bull. Sc. Lab. Denison Univ., XI, p. 255 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head shining metallic, bluish black; middle of rostrum pitchy brown, tip and base black; maxillary palpi black; antennae dark brown to blackish brown at base, blackish towards apex; vertex sparingly punctuate. Front finely, transversely rugose. Thorax and abdomen shining metallic, bluish black. Anal appendages of male black, ovipositor of female brown, darker at the base and the tip. Legs pale brown, tip of femora, tibiae and of tarsal joints blackish, terminal joints of tarsi mostly black. Wings of male and rudimentary wings of female brown. Ovipositor rather long, much more than half as long as the abdomen. Lower appendage in male truncate at tip.

Length of body : ♂ 3,5^{mm}; ♀ 5^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♂ Kaslo B. C. (ex coll. BANKS).

[*B. unicolor* Hine] (fig. 125).

Boreus unicolor HINE, Bull. Sc. Lab. Denison Univ., XI, p. 256 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head shining black; rostrum and maxillary palpi pitchy brown to black, the lateral margins of rostrum brown in the middle. Antennae pitchy brown to black. Vertex sparingly punctuate; front finely rugose and

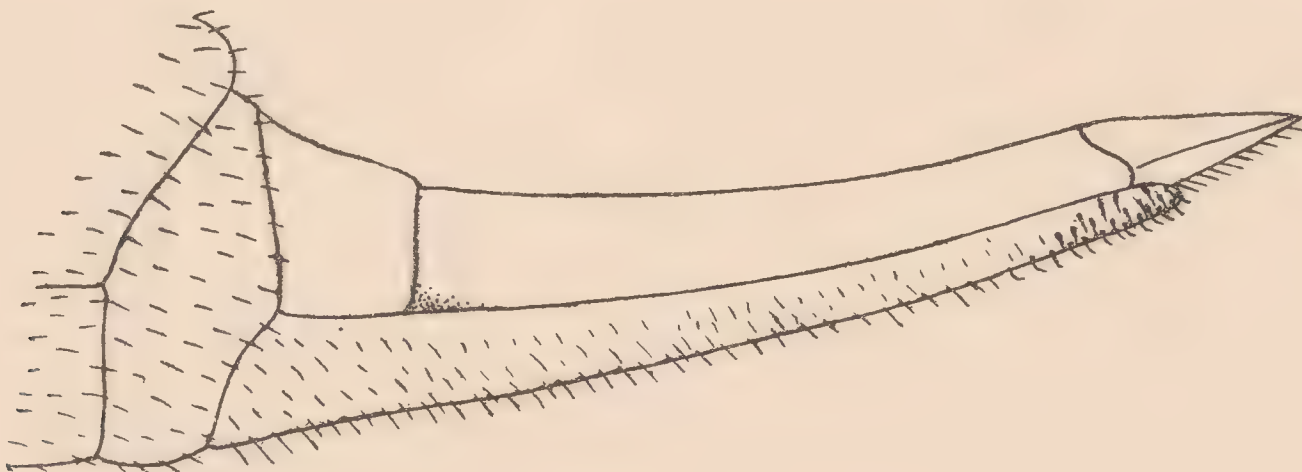


FIG. 125. — *Boreus unicolor* ♀
Apical part of abdomen.
(Coll. Esben-Petersen).

above the insertion of antennae with a few punctuations. Thorax and abdomen shining black. Anal appendages of male and ovipositor of female black. Legs pitchy black. Wings of male and rudimentary wings of female black. Ovipositor of female very long, nearly as long as the abdomen. In the male the lower appendage is triangular, the sides slightly rounded at the apex, which is truncate.

Length of body : ♂ 3^{mm}; ♀ 5^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Montana (ex coll. BANKS).

FAM. BITTACIDAE.

ENDERLEIN, Zool. Anz., XXXV, p. 387 (1910).

This tipuliform family is easily recognized by the slenderness in all parts and especially by the modified tarsi, in which the terminal joint bears only one claw and may be folded down against the 4th.

Head small; eyes prominent; ocelli large; rostrum long and slender. Labial palpi 2-jointed, long and slender, the apical joint the longest. Maxillary palpi long and slender; 1st joint a little longer than broad; 2nd about twice as long as broad, thickened towards the tip; 3rd joint one and a half times longer than 1st and 2nd together and as long as 4th and 5th together; 4th and 5th nearly of same length; 5th the most slender. Mandible with a small

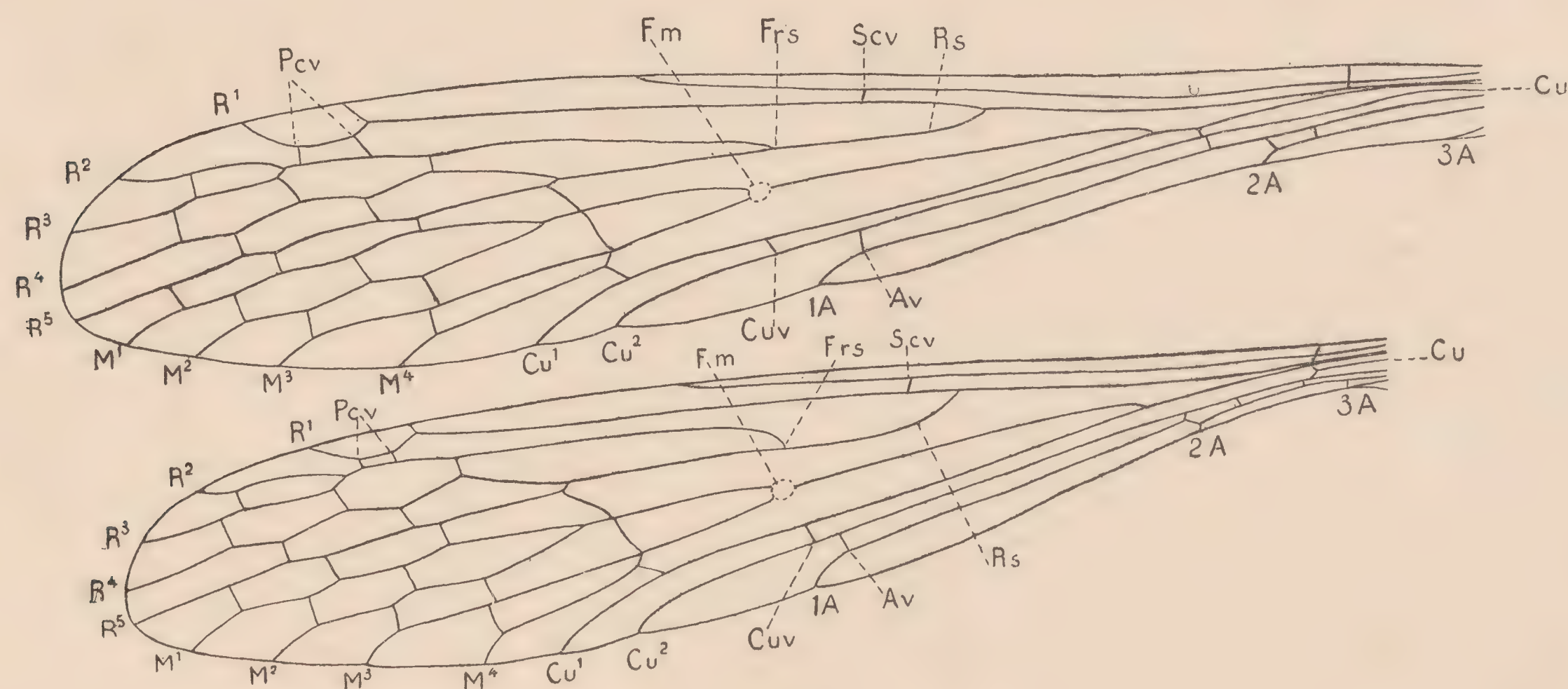


FIG. 126. — *Bittacus Banksi*
Fore-and hindwing.

R^1 = radius; R^2, R^3, R^4, R^5 = branches of radial sector; R_s = radial sector; M^1, M^2, M^3, M^4 = branches of media (M); Cu^1, Cu^2 = branches of cubitus; 1A, 2A, 3A = first, second and third anal vein; Frs = fork of radial sector; Fm = fork of media; Scv = apical cross vein in the subcostal area; Cuv = apical cross vein in the cubital area; Av = apical cross vein in the area between Cu^2 and 1A; Pcv = cross veins between the pterostigma and R^2 .

dent on the innerside near to the tip. Legs and abdomen long and slender. The tarsal joints of different length; the 1st-3rd and the basal half of 4th with two rows of strong bristles on their underside. The 4th somewhat curved on the upperside and with a transverse furrow on the side; the terminal joint claw-shaped and terminating in a single claw, which is short and stout on the posterior legs, longer and more slender on the fore and intermediate legs. All the tibiae with two long spines at their tip.

Of the abdominal segments the 1st, 8th and 9th are short. In the ♂ the dorsum of 9th segment is much prolonged and deeply cleft, forming two shorter or longer appendages (upper appendages), whose shape and size are of great specific value. The 9th segment bears ventrally a pair of claspers, which coalesce along their ventral side and form a hollow, in which the base of the penis is concealed. The 10th segment is very small and not visible in

dried specimens; it bears a pair of unsegmented cerci. The penis is subcylindrical, and its apex is prolonged into a long, curved and pointed titillator. The cerci and titillator as a rule visible by side view.

In the female the subgenitalplate covers for the most part all the venter of 8th and 9th segment; its side margins coalesce with the venter of the segments, and only its apical margin is free. At the apex it has an incision in the middle, whereby two short, strongly haired, lobes are formed. The median part of the subgenitalplate, especially towards the base, not chitinated; in dried specimens the subgenitalplate therefore very often looks like two plates. The very small 10th segment, hardly visible in dried insects, bears two unsegmented cerci.

In the fore- and hindwing Cu^1 coalesces for a longer distance with M, and in the hindwing the same takes place as to Cu^2 and 1A. Two or three anal veins are present. 1A joins the posterior margin far out, about in the middle of the wing; the 2A much nearer to the base, and the 3A is often absent. Rs and M furcate several times; present are R^2 , R^3 , R^4 and R^5 ; M^1 , M^2 , M^3 and M^4 . The pterostigmatal area is distinctly circumscribed by a cross vein from R^1 to the costal margin and by the curved part of R^1 beyond the cross vein. At Fm and sometimes also at Frs is found a clear spot, and in each of the two first cellules between Rs and M is found a small chitinous dot. In the costal area a cross vein is found near to the base, and sometimes one or two more are present in the apical part.

In the genus *Neobittacus* 4 or 5 cross veins are present in the costal area. As to the venation of the wings of *Bittacidae* as well as of *Panorpidae* it may always be remembered that the venation is liable to vary, and hasty conclusions should not be formed from single specimens presenting unusual characters in this respect.

Besides the ordinary pilosity on the margins of the wings a row of strong bristles is found in a number of species near the base.

In one genus, *Apterobittacus*, no wings are present.

The family is found in all parts of the world with the exception of the Northern parts of Europe, Asia and America.

TABLE OF GENERA.

1. Wings not present	APTEROBITTACUS.
Wings present	— 2.
2. Wings strongly marked with dark cross bands and dark coloured apex, falcate at the tip. Costal area with 4-5 cross veins	NEOBITTACUS.
Wings not marked with dark cross bands (sometimes an apical spot is present); not falcate at the tip. Costal area with 1-3 cross veins	— 3.
3. Eyes very large, touching each other below the antennae	PAZIUS.
Eyes wide apart below the antennae	— 4.
4. In the hindwing 1A coalesces with Cu^2 for its whole length	KALOBITTACUS.
In the hindwing 1A only coalesces with Cu^2 for a short distance	— 5.
5. Basal joint of hind tarsus of the same length as 4th or a little shorter	HARPOBITTACUS.
Basal joint of hind tarsus longer than 4th	BITTACUS.

Genus **BITTACUS** Latr.

LATREILLE, Hist. nat. des Crust. et des Ins., VIII, p. 20 (1805). — ID., Gen. Crust. et Ins., III, p. 189 (1807). — KLUG, Abh. Königl. Akad. Wiss. Berl., p. 97 (1836). — BURMEISTER, Handb. Ent., II, p. 955 (1839). — RAMBUR, Hist. nat. Ins. Névr., p. 326 (1842). — BRAUER, Verh. zool.-bot. Ges., V, pl. 2, p. 707 (1855). — ID., ibid., XIII, pl. 14, pp. 307-324 (1863). — ID., ibid., XXI, pl. 3, pp. 109-116 (1871). — BRAUER et Löw, Neuropt. austr., p. 36 (1857). — FELT, N. Y. State Entomologist, Report, X, pp. 463-480, pl. 3-4; pp. 463-480 (1896). — HINE, Journ. Columb. Horticult. Soc., XII, pl. 1-2, pp. 105-116 (1898). — MAC CLENDON, Entom. News, fig. 15, p. 121 (1906). — KLAPÁLEK, Acta Soc. Ent. Bohem., VII, p. 114 (1910). — ENDERLEIN, Zool. Anz., XXXV, p. 396 (1910). — ESBEN-PETERSEN, Revue Zool. Afr., III, p. 135 (1913). — BANKS, Trans. Amer. Ent. Soc., XXXIX, p. 233 (1913). — LESTAGE, Revue Zool. Afric., V, p. 112 (1917).

Leptobittacus HINE, Journ. Columb. Horticult. Soc., XII, p. 108 (1898).

Thyridates NAVÁS, Mem. Real Acad. Cienc. Art. Barcelona, p. 412 (1908).

Diplostigma NAVÁS, Ibid., p. 413 (1908).

Haplodictyus NAVÁS, Ibid., p. 413 (1908). — ID., Revue russe d'Entom., p. 277 (1908).

Eyes wide apart below the antennae. Wings present, not falcate at the tip, and not marked with bands; in a few cases are found some small spots on the disc or a larger one at the tip. In the hindwing 1A only coalesces with Cu² for a short distance. Basal joint of hind tarsus longer than 4th.

Type : *B. italicus*.

Eurasiatic species.

B. italicus O. F. Müller (fig. 127).

Panorpa italica O. F. MÜLLER, Manip. Ins. Taur. ed. Allioni, Miscell. Taurin., III, p. 194 (1766).

Bittacus italicus KLUG, Abh. Königl. Akad. Wiss. Berl., p. 97 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 465 (1853). — BRAUER, Verh. zool.-bot. Ges., X, pl. 12, fig. 2, p. 691 (1860). — NAVÁS, Neur. de España y Portugal, p. 149 (1908).

Panorpa tipularia FABRICIUS, Syst. Ent., p. 314 (1775). — ID., Spec. Ins., p. 401 (1781). — ID., Ent. Syst., p. 98 (1793). — SULZER, Geschichte d. Ins., p. 177, pl. 25, fig. 7-8 (1776). — VILLERS, Entom. Linn., III, p. 66, pl. 7, fig. 11 (1789). — RÖMER, Gen. Ins., pl. 25, fig. 7-8 (1798).

Bittacus tipularius LATREILLE, Hist. nat. Crust. et Ins., VIII, p. 20 (1805). — ID., Gen. Crust. et Ins., III, p. 189 (1807). — GUÉRIN, Iconogr. du Règne Animal, pl. 61, fig. 2 (1829-1844). — BURMEISTER, Handb. Ent., II, p. 955 (1839). — RAMBUR, Hist. nat. Ins. Névr., p. 326 (1842). — BRAUER, Verh. zool.-bot. Ges., V, p. 707 (1855). — ID., ibid., XIII, pl. 14, pp. 307-324 (1863). — ID., ibid., XXI, pl. 3, pp. 109-116 (1871). —

BRAUER, Verh. zool.-bot. Ges., V, p. 707 (1855). — ID., ibid., XIII, pl. 14, pp. 307-324 (1863). — ID., ibid., XXI, pl. 3, pp. 109-116 (1871). — BRAUER et Löw, Neur. austr., p. 36 (1857). — MEYER-DÜR, Neur. d. Schweiz, p. 360 (1875) (Switzerland). — GIRARD, Traité d'entom., II, p. 407 (1876). — ROSTOCK, Neur. germ., p. 116 (1888) (Germany). — ALBARDA, Cat. rais. syn. Névropt., p. 111 (1889) (Belgium). — STROBL, Mitt. nat. Ver. Steierm., p. 242 (1905) (Steiermark). — KEMPNY, Bull. Soc. Scienc. de Bucarest, p. 673 (1906) (Roumania). — MONTANDON, ibid., p. 679 (1906). — KLAPÁLEK, Acta Soc. Ent. Bohem., p. 114, fig. 1-2 (1910).

Panorpa tipuloides SCHRANK, Beitr. z. Naturgesch., p. 82 (1776). — ID., Enum. Ins., p. 317 (1781).

Head and rostrum brown; maxillary palpi brown, darker towards apex; a black spot between the ocelli. Antennae dark brown, basal joints paler. Thorax brown to blackish brown dorsally. Abdomen pale brown to dark brown. Legs yellowish brown to brown, tip of femora, tibiae and of tarsal joints darker. Wings rather broad with somewhat pointed tip. Membrane hyaline with a slight yellowish tinge; venation pale brown; cross veins in the apical part sometimes narrowly margined with brown. No apical cross vein in the costal area. Subcostal

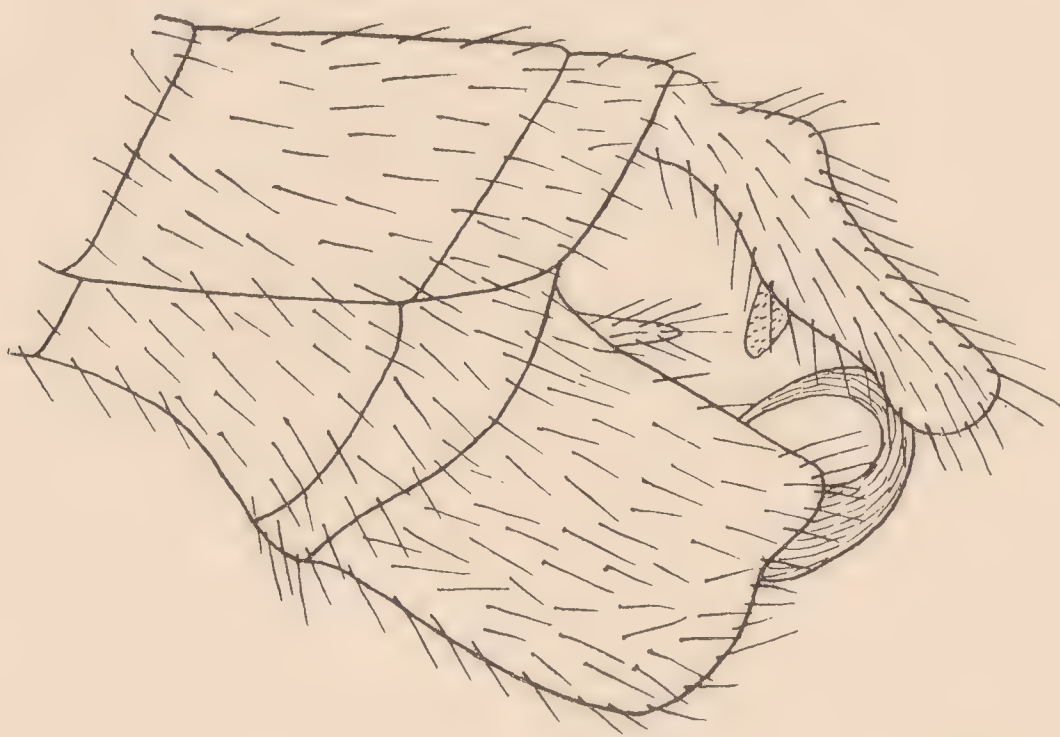


FIG. 127. — *Bittacus italicus* ♂
Lateral view of anal appendages
(Coll. Selys).

cross vein in forewing about half way between origin and fork of Rs, in hindwing nearest to the origin. Fork of Rs a little before fork of M. At the fork of M a rather large, circular, whitish spot. Cubital cross vein opposite to or a little beyond fork of M. No anal cross vein. 1A ends in forewing about half way between origin and fork of Rs, in hindwing a little beyond. Pterostigma subrectangular, two and a half times longer than broad, with yellowish colour, which passes beyond R^2 in aged specimen; pterostigma connected with R^2 by two cross veins. Black bristles on the margins far from the base of the wings. A few black bristles on the coxae. In the male the branches of upper appendage, seen from side, are rather narrow and short. In the middle of the inner margin inferiorly is a long, downwards directed dent, the apex of which is densely provided with very short black bristles. At the tip the underside is broadly produced inferiorly downwards into a broad and short, somewhat triangular flap. The tip with very short black bristles inferiorly.

Forewing : 18-20^{mm}; hindwing : 16-17^{mm}.

Coll. SELYS (general coll.) : 7 ♂, 11 ♀ (Belgian coll.) 6 spec. — Coll. ESBEN-PETERSEN : 1 ♂, 5 ♀ Spain (ex coll. NAVÁS); 3 ♂, 2 ♀ Roumania (MONTANDON leg.); 1 ♀ Bosnia:

B. Hageni Brauer (fig. 128).

Bittacus Hageni BRAUER, Abh. zool.-bot. Ges., X, p. 691, pl. XII, fig. 1 (1860) (Austria). — MAC LACHLAN, Soc. Ent. Belg., p. 9 (sep.) (1881) (Belgium). — ROSTOCK, Neur. germ., p. 116 (1888). — ALBARDA, Cat. rais. syn. Nevv., p. 112 (1889). — MAC LACHLAN, Ent. Monthl. Mag., XXXIV, p. 233 (1898) (Wallachia). — J.-L. LACROIX, La Feuille des Jeunes Naturalistes, p. 44 (1914) (France).

Head and rostrum yellowish brown; maxillary palpi dark brown, the tip of apical joint paler. A blackish spot between the ocelli. Antennae yellowish brown, darker towards the apex; the two basal joints stout. Thorax and abdomen yellowish brown; some of the abdominal segments with a narrow blackish cross band near to and along the hind margin. Legs yellowish; tip of femora and tibiae brown. Wings rather broad with broadly rounded tip. Membrane hyaline with a faint yellowish tinge. Venation pale brown; some of the cross veins in the apical

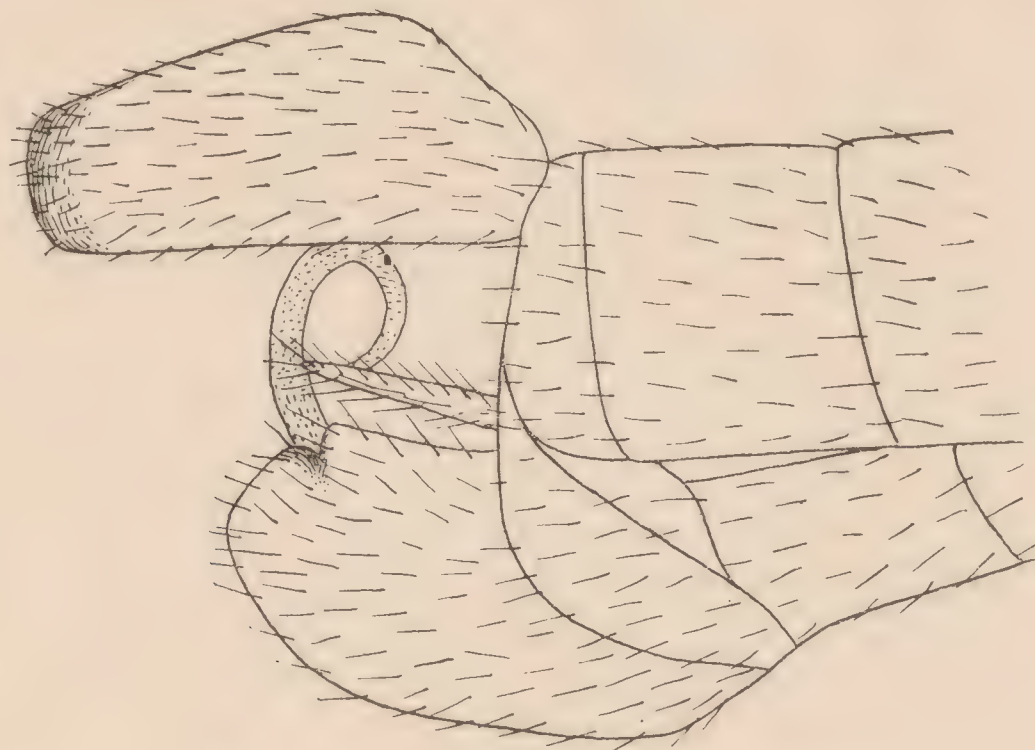


FIG. 128. — *Bittacus Hageni* ♂
Lateral view of anal appendages.
(Coll. Selys).

part narrowly margined with brown. A pale brownish spot at the place where M separates from Cu¹, at the origin and at the fork of Rs and a more indistinct one near the end of Cu². The whitish spot at the fork of M very small. No apical cross vein in the costal area. The subcostal cross vein in forewing about half way between the origin and the fork of Rs, in the hindwing nearest to the origin of Rs. Fork of Rs opposite to fork of M. Cubital cross vein before fork of M. No anal cross vein. 1A ends in forewing a little beyond the origin of Rs, in hindwing far beyond but before cubital cross vein. Pterostigma subrectangular, two and a half times longer than broad, rather indistinct, yellowish coloured, connected with R² by two cross veins. A few black bristles on the front margin of the wings close to the base, a greater number on hind margin and far outer. No bristles on the coxae. In the male the branches of upper appendage are yellowish white, rather broad; on the inner side of their upper margin in the middle and at the apex inferiorly a black thickening provided with short black bristles; in the middle of the lower margin inferiorly an inwards directed blunt dent, provided with two or three blackish bristles.

Forewing : 17-19^{mm}; hindwing : 15-16,5^{mm}.

Coll. SELYS : 1 ♂ labelled [Austria] [*Hageni*]. — Mus. Vienna : 1 ♂ labelled [Bator, ROGHEF. 17.7.62]. — Mus. Copenhagen : 1 ♀ Anhalt (RÖDER leg.).

The species has much likeness to *B. italicus*, but its wings are broader, their tip more rounded, the pale brown spots are hardly visible in the latter, the white spot at the fork of M is larger, 1A is shorter, there are no bristles on the coxae, and only for a short distance the margins of the wings are provided with bristles. The anal appendages of the males are very different.

[**B. indicus** Walker] (fig. 129).

Bittacus indicus WALKER, Cat. Neur. Ins. Brit. Mus., p. 469 (1853).

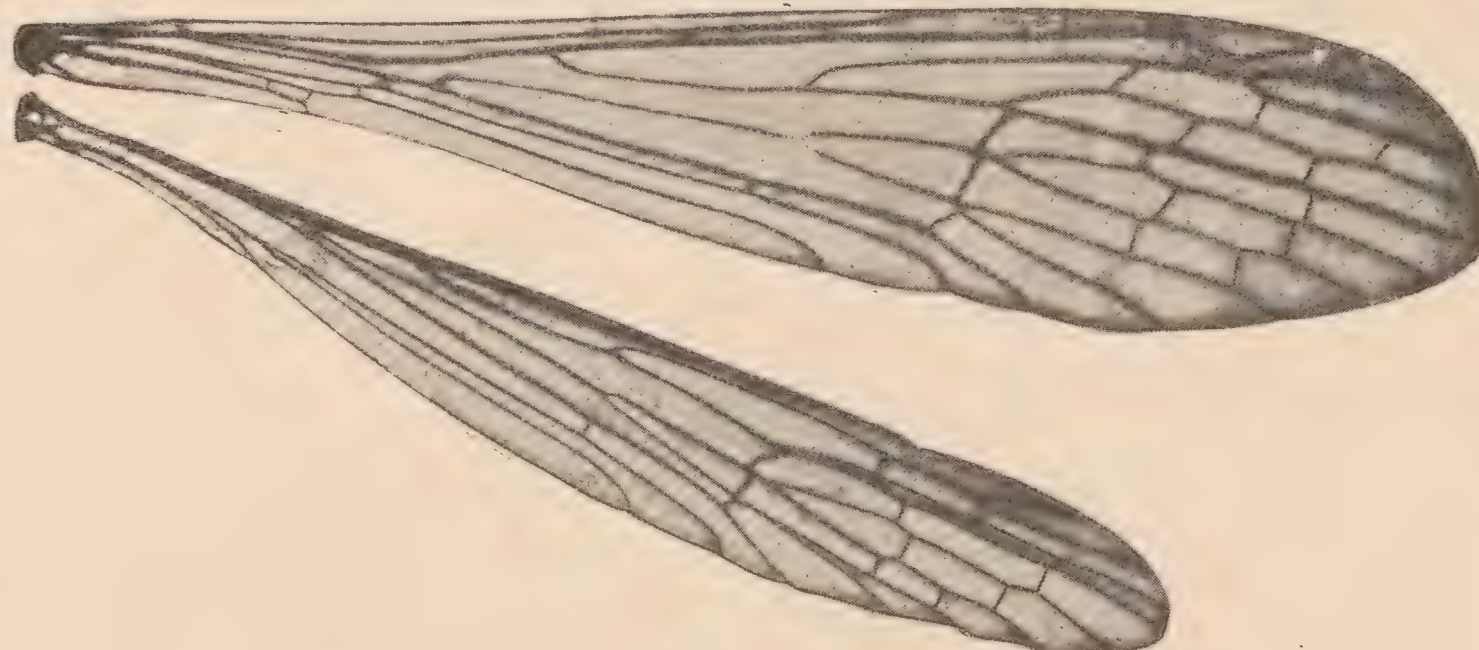


FIG. 129. — *Bittacus indicus* type-specimen
(Museum London).

Head pale brown; rostrum shining brown; maxillary palpi brown; vertex black between the ocelli. Antennae yellowish brown; basal joint subcylindrical, second globular, both very stout. Thorax and basal abdominal segments brown. Legs slender, brown; tip of femora and tibiae with a narrow blackish brown band. Wings long and narrow, somewhat acute at the tip, with pale greyish brown tinge and yellowish brown venation, especially in the apical part. No apical cross vein in the costal area. Subcostal cross vein half way between origin and fork of Rs. Fork of Rs opposite to fork of M. Cubital cross vein before fork of M. No anal cross vein. 1A joins the hind margin beyond the fork of M. A few bristles on the hind margin of the wings near the base. 1A ends far outer than M and Rs furcate. No apical cross vein between Cu^2 and 1A. Pterostigma subtriangular, connected with R^2 by two cross veins, placed close together.

Forewing : 19^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 spec. (abdomen lost), E. India (one of WALKER's type series).

[**B. insularis** Esben-Peters.] (fig. 130).

Bittacus insularis ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 234 (1915).

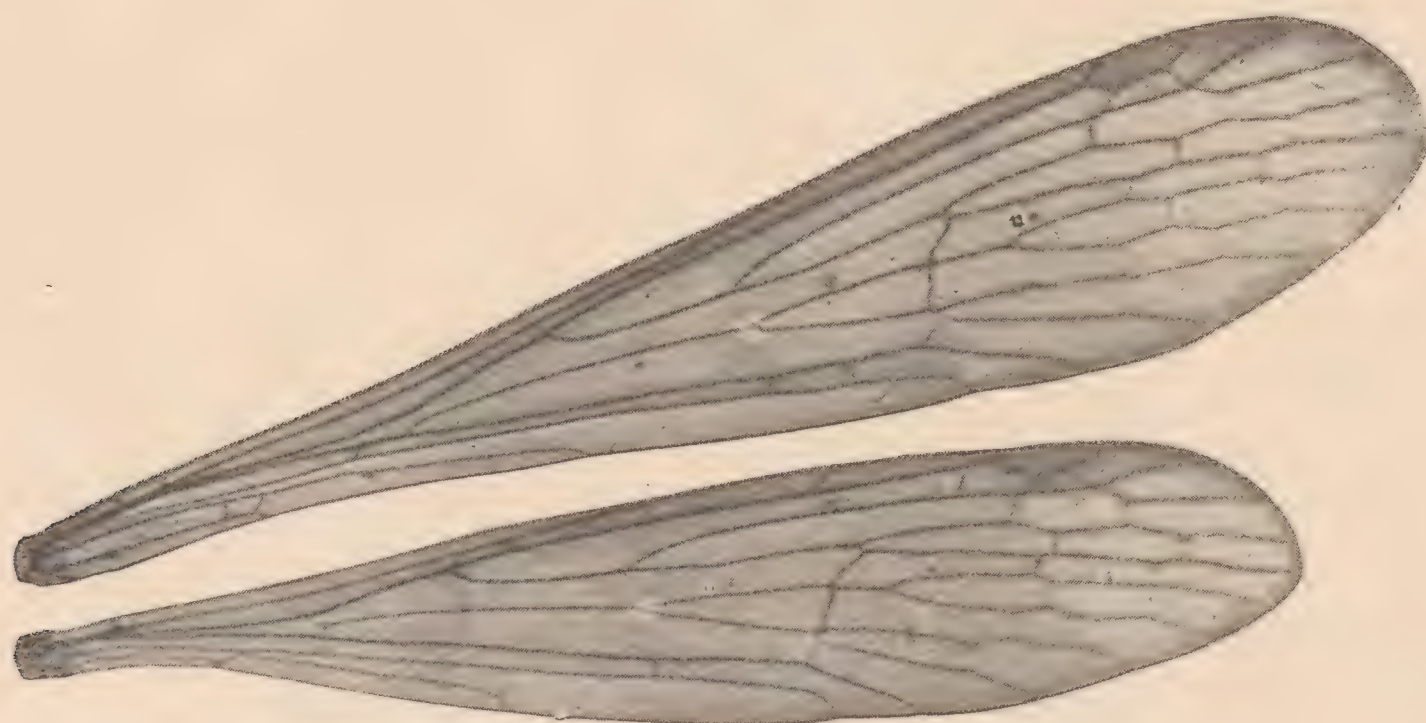


FIG. 130. — *Bittacus insularis* ♀ type-specimen
(Museum London).

Head brown; rostrum pitchy brown towards the tip; vertex black between the ocelli. Antennae slender, dark brown; basal joint subcylindrical, globular, both very stout. Prothorax pitchy brown, meso- and meta-thorax reddish brown. Abdomen brown. Legs slender, brown; femora, tibiae and tarsal joints with blackish tip. Wings narrow, slender with rounded tips and with pale greyish brown tinge; apical margin shaded with pale sooty brown. Venation brown. No apical cross vein in the costal area. Subcostal cross vein in forewing half way between origin of radial sector and its fork, in hindwing nearest to the origin. Fork of radial sector

opposite to fork of M. Cubital cross vein a little beyond fork of M. No anal cross vein. 1A joins the hind margin far before fork of M and a little beyond origin of radial sector. Pterostigma subrectangular, two Pcv. A few bristles on the hind margin of wings near base.

Forewing : 15^{mm}; hindwing : 13^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♀ Ceylon, 29.XI.1908.

[**B. latipennis** Gerst.] (fig. 131).

Bittacus latipennis GERSTAECKER, Mitt. nat. Ver. Neu-Vorp. Rüg., p. 120 (1885).

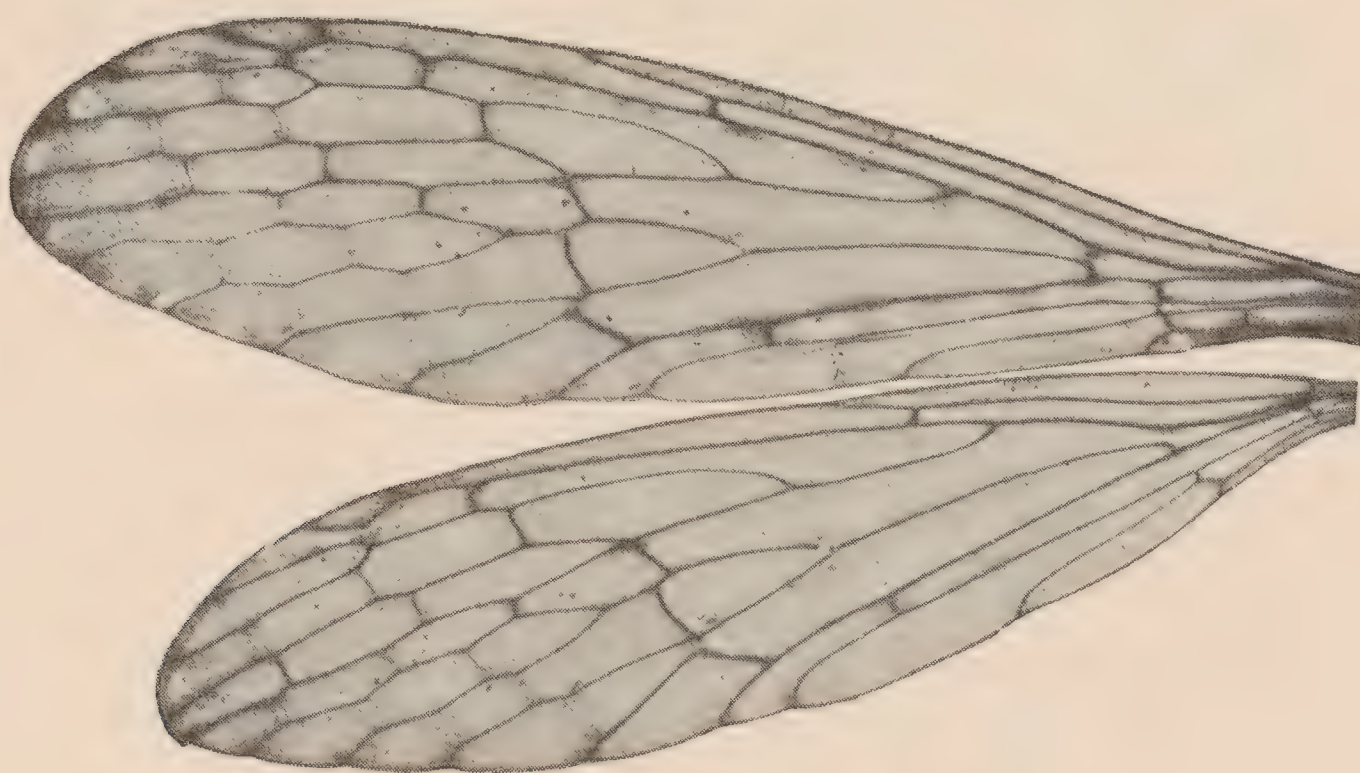


FIG. 131. — *Bittacus latipennis* type-specimen (Museum Greifswald).

Face, rostrum and vertex reddish brown; the ocelli placed in a dark circular spot. Antennae pale yellowish ventrally, pitchy brown with exception of 2nd-6th joint dorsally. Thorax reddish brown; a longitudinal darker median streak on meso- and metathorax; scutellum of meso- and metathorax dark brown and shining. Abdomen wanting. Legs brown; tip of femora and tibiae darker. Wings with yellowish brown tinge and with several more or less distinct irregular hyaline spots. Venation brown. Pterostigma small and connected with R² by one cross vein.

Forewing : 19^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Mus. Greifswald : 1 specimen, Darjeeling (type).

B. sinensis Walker (fig. 132, 133).

Bittacus sinensis WALKER, Cat. Neur. Ins. Brit. Mus., p. 469 (1853). — MAC LACHLAN, Mitt. schweiz. Ent. Ges., p. 406 (1887). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 386 (1913).

Diplostigma sinense NAVÁS, Mem. Real. Acad. Cienc. Art. Barcelona, p. 413 (1908). — ID., Revue Russe d'Entom., p. 277 (1909).

Bittacus quaternipunctatus ENDERLEIN, Zool. Anz., p. 397 (1910). — MIYAKÉ, ibid., p. 387, pl. 33, fig. 6; pl. 37, fig. 10 (1913).

Bittacus strategus NAVÁS, Bull. Mus. d'Hist. nat., Paris, p. 442, fig. 2a, 2b (1913).

Head pale brown with black between the ocelli. Rostrum fuscous with paler tip. Maxillary palpi fuscous. Antennae brown, strongly haired. Thorax and abdomen pale brown. Abdomen in the male swollen at the tip. Legs reddish brown. Femora and tibiae with a narrow black band at the tip. Wings with a strong yellowish tinge and broadly rounded apex. Venation

yellowish brown, distinct. Some of the cross veins in the apical part faintly and narrowly brownish shaded. In fore- and hindwing four dark brown spots, one at M, where it separates



FIG. 132. — *Bittacus sinensis* ♂
(Coll. Selys).

from Cu¹, one at the base of Rs, one at Scv, and one at the first fork of Rs. Pterostigma

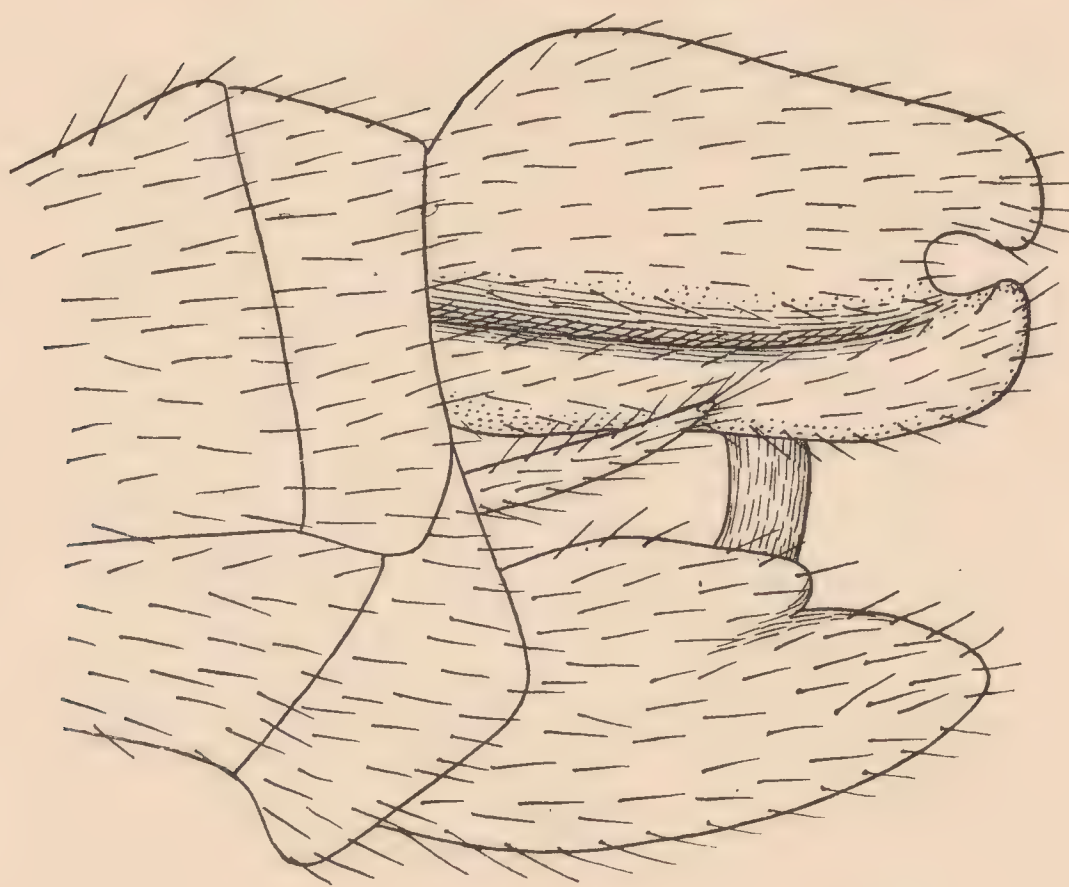


FIG. 133. — *Bittacus sinensis* ♂
Lateral view of anal appendages
(Coll. Selys).

subquadrangular, yellowish, two Pcv in the forewing. Only a basal cross vein between costa and Sc. Av as a rule present. Bristles on the margin of wings near base.

Forewing : 24^{mm}; hindwing : 21^{mm}.

Coll. SELYS : 4 ♂, 5 ♀ + 1 spec. (abdomen lost) [81] Japan (PREYER leg.). — Mus. London : 1 ♀ China (SAUNDERS 68.3); 2 ♀ Tinghai 5.99 (PHILIP DE LA GARDE 1906-88). — Mus. Paris : 1 ♀ (labelled by NAVÁS, as *Diplostigma sinense*); 1 ♂ (type-specimen of *strategus*) Tokyo.

The first mentioned specimen from Mus. London belongs to the type-series of WALKER. It seems as if some of the Chinese specimens have the cross veins a little stronger shaded than

the Japanese specimens. The genus *Diplostigma* founded by NAVÁS cannot hold good; the cited characters are such as are found in the greater number of species. The type-specimen of *B. strategus* is a typical specimen of *B. sinensis*.

[**B. Mastrillii** Navás] (fig. 134, 135).

Bittacus Mastrillii NAVÁS, Bull. Mus. d'Hist. nat., Paris, p. 443 (1913).

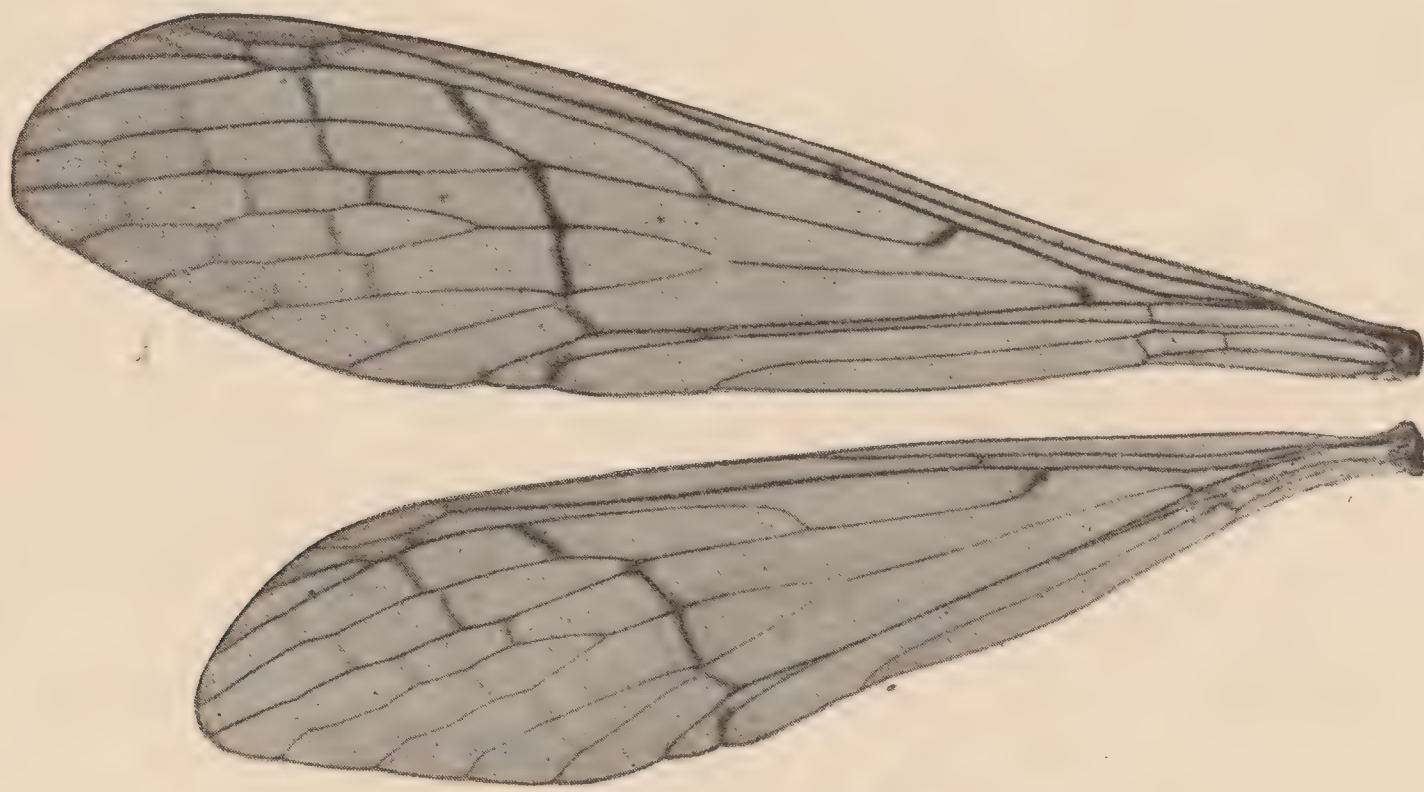


FIG. 134. — *Bittacus Mastrillii* ♂
(Museum Hamburg).

Face and rostrum pitchy brown, apex of rostrum brown. Maxillary palpi pitchy brown, apical joint brown. Vertex black. The two basal joints of antennae brown (the remainder of the antennae lost). Prothorax

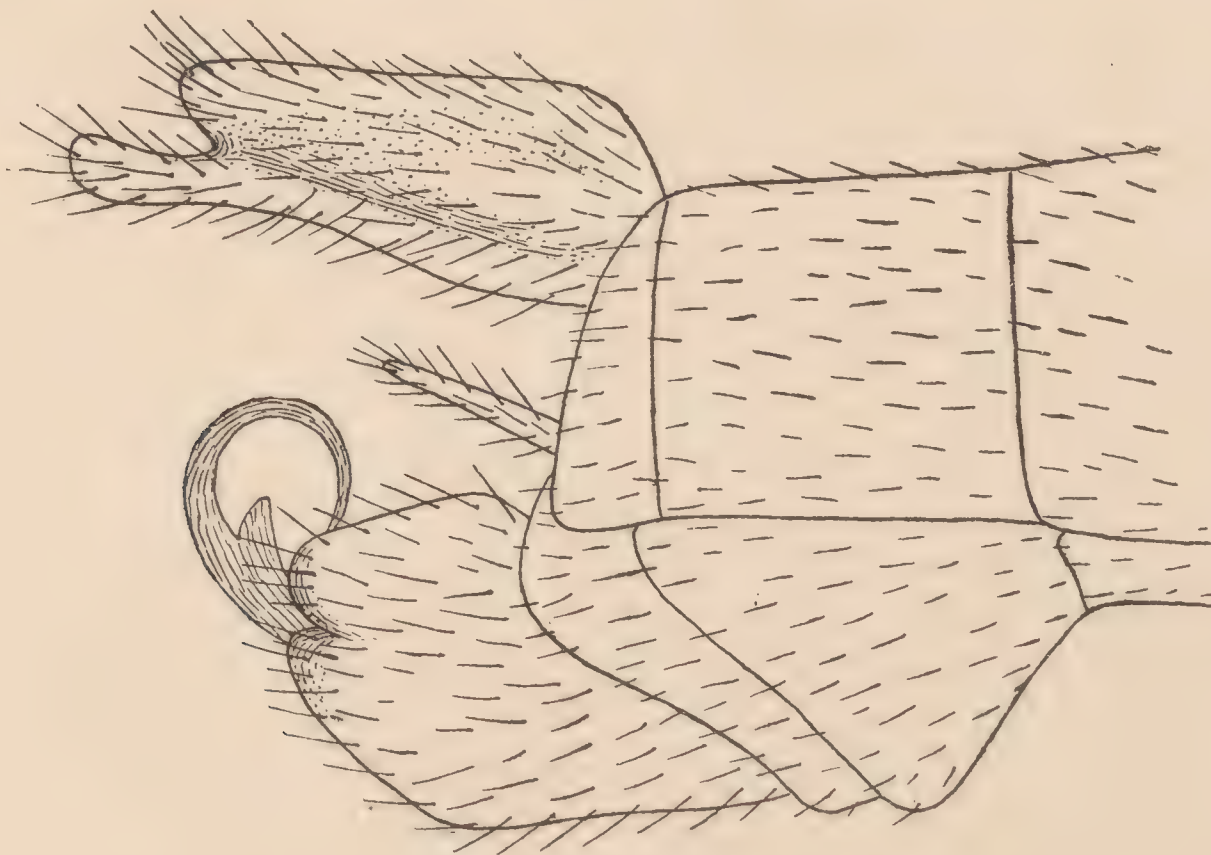


FIG. 135. — *Bittacus Mastrillii* ♂
Lateral view of anal appendages
(Museum Hamburg).

dark brown above; front part of mesothorax pitchy black with a pale brown median streak; hind part of meso- and metathorax pale brown above. Sides and venter of prothorax pale brown. Abdomen greyish brown dorsally, darker at the apex. Basal joints of the abdominal segments with narrow black hind border. Legs reddish brown; tip of femora and tibiae black; hind feet blackish brown. Appendages of male yellowish brown; upper appendage deeply cleft at tip; lower branch curved inwards and upwards; upper branch with short black bristles on the interior side. Wings with yellowish tinge, somewhat pointed at tip. Venation

brown; the cross veins in the apical part more or less brownish shaded; the first row is especially distinctly shaded. In forewing two brown spots, one at the origin of Rs and one where M separates from Cu. A few bristles one the front margin of the wings close to the base; a longer row on the hind margin near to the base.

Forewing : 23^{mm}; hindwing : 20,5^{mm}.

Coll. SELYS : not present. — Mus. Hamburg : 1 ♂, 1 ♀ Japan. — Mus. Paris : 1 ♀ (type of NAVÁS) Mount Nantai, Japan.

By the somewhat pointed apex of wings and by the pterostigma, which is rather long, the species is easily separated from the other Japanese species. The specimens described by MIYAKÉ in Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 385, pl. 33, fig. 9; pl. 37, fig. 9 as *B. laevipes* seem to belong to this species

[*B. laevipes* Navás] (fig. 136).

Bittacus laevipes NAVÁS, Revue Russe d'Entom., p. 276 (1909).

Head rufous, blackish brown on vertex. Rostrum paler at apex. Antennae dark brown; dorsum of metathorax blackish, with a longitudinal, brown, median streak posteriorly. Abdomen brown; 2nd to 6th segments dorsally with a fine black line along their hind borders. Legs brown; tip of femora, tibiae and

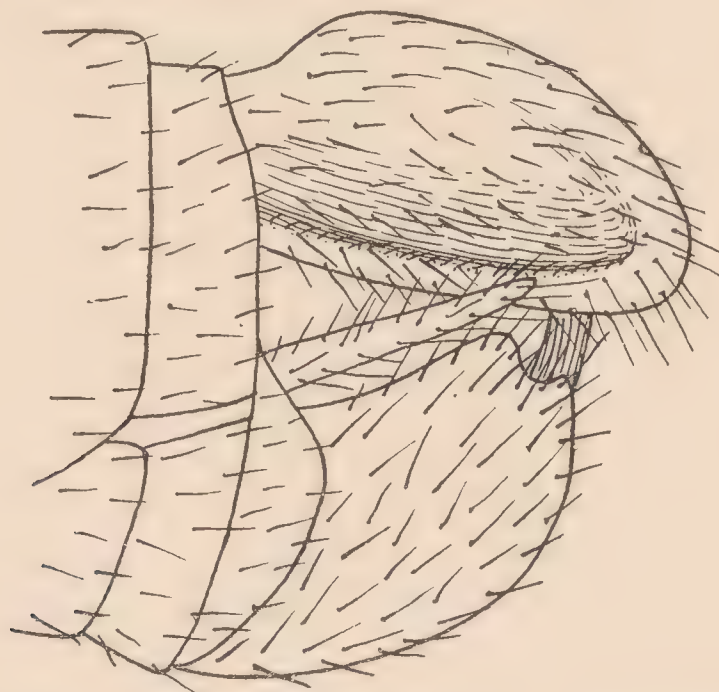


FIG. 136. — *Bittacus laevipes* ♂ type-specimen
Lateral view of anal appendages
(Museum Paris).

of intermediate and hind tarsal joints blackish brown. Wings with a strong yellowish tinge, broadened towards apex and with obtuse tip. Venation yellowish brown. Apical cross veins brownish shaded. Pterostigma yellowish, subquadrangular; two Pcv present. No apical cross vein in the costal area, and no Av.

Forewing : 20^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♂ Japan (DROUART DE LEZEY leg.) (type). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Kyoto (NOHIRA leg.); 1 ♂, 1 ♀ Tokyo (NAKAHARA leg.).

B. nipponicus Navás (fig. 137, 138).

Bittacus nipponicus NAVÁS, Revue Russe d'Entom., p. 275, fig. (1909). — MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 383, pl. 31, fig. 3, 4; pl. 33, fig. 7 (1913).

Head brown with a darker spot enclosing the ocelli. Rostrum dark brown in its lower half. Antennae brown. Thorax and abdomen pale brown. Mesothorax dorsally castaneous. Hind border of 2nd to 6th segments narrowly blackish bordered. Legs yellowish brown; tip of

femora, tibiae and tarsal joints dark brown. Underside of posterior femora, especially in the male, with long, raised, blackish bristles. Wings with a strong yellowish tinge, broadened

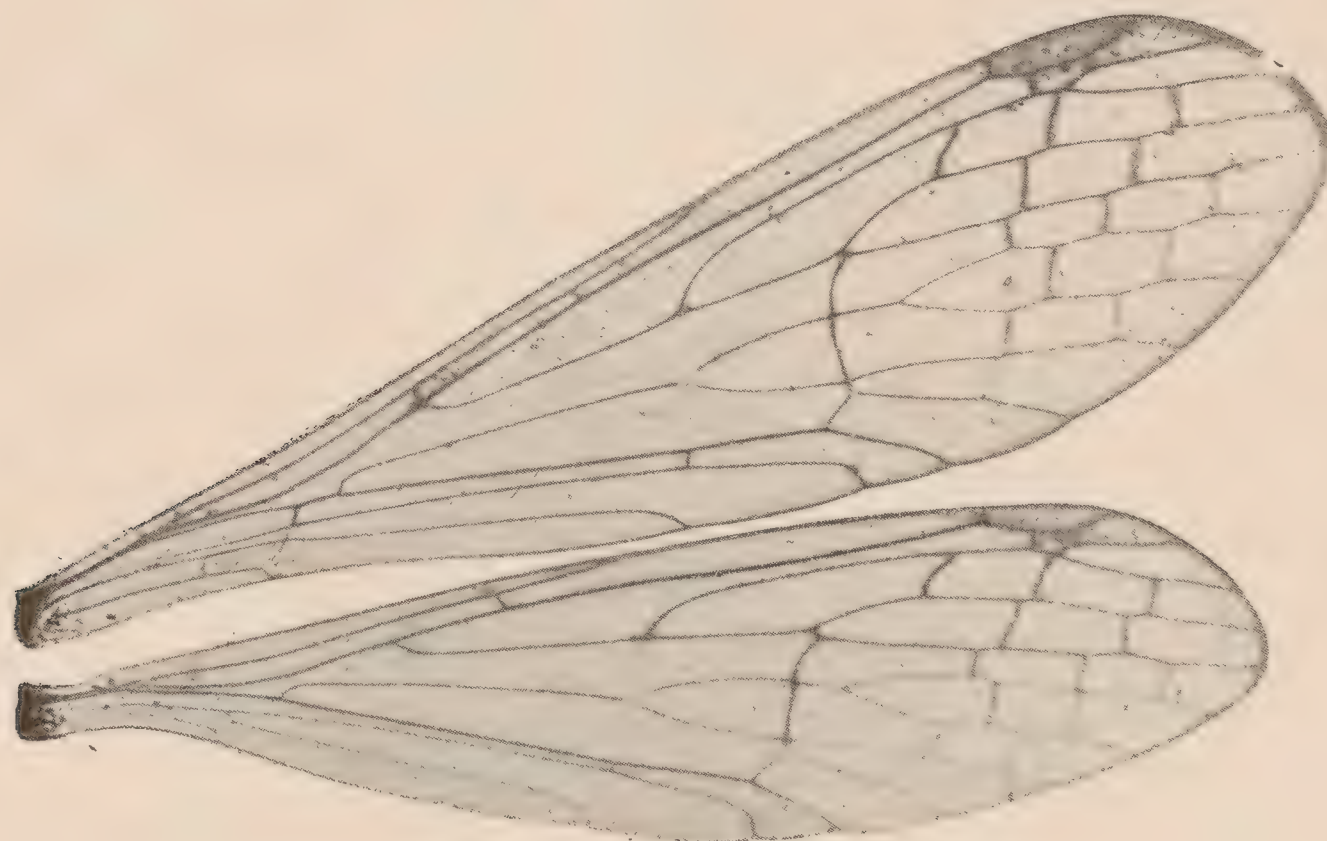


FIG. 137. — *Bittacus nipponicus* ♂
(Coll. Esben-Petersen).

towards apex and with an obtuse tip. Venation yellowish brown; the apical cross veins brownish

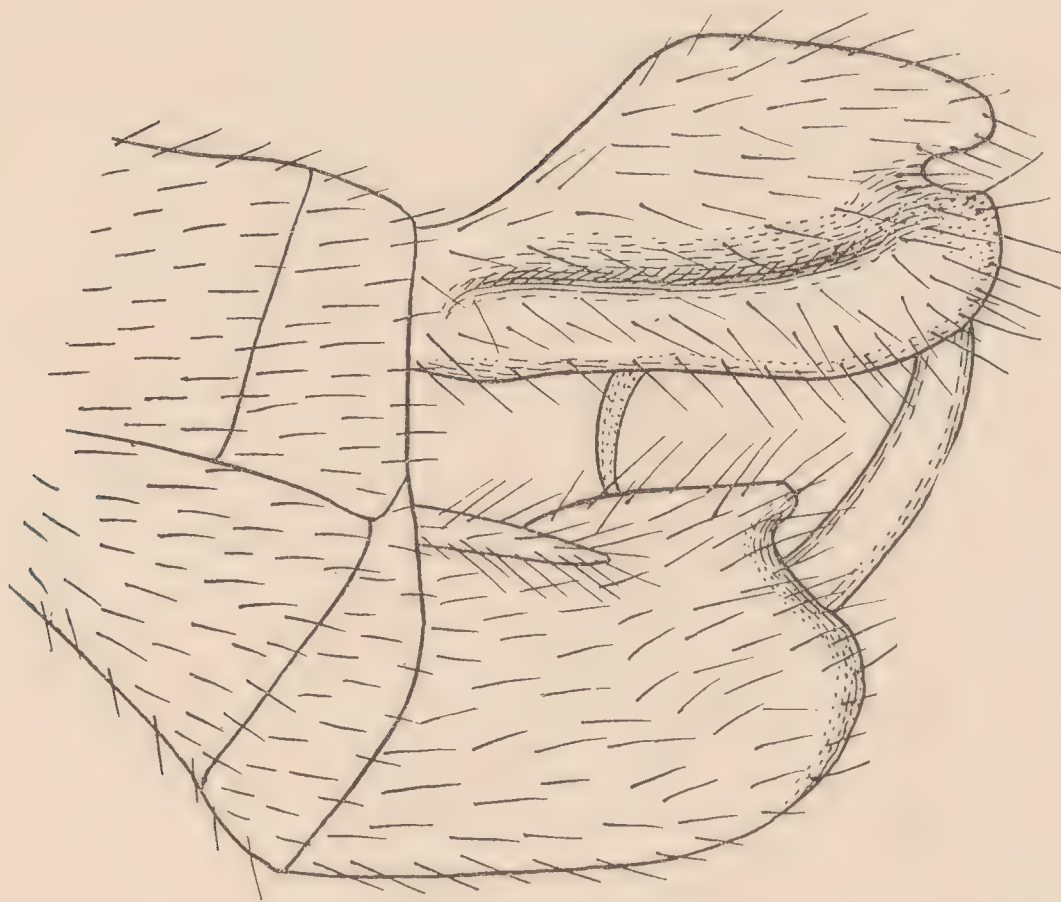


FIG. 138. — *Bittacus nipponicus* ♂
Lateral view of anal appendages
(Coll. Selys).

shaded. Pterostigma yellowish, subquadrangular; two Pcv present. No apical cross vein in the costal area; no Av present. Bristles on the margins of wings.

Forewing : 18^{mm}; hindwing : 16^{mm}.

Coll. SELYS : 1 ♂, 1 ♀ + 3 spec. (abdomen lost) [78] Japan (PREYER leg.). — Mus. Paris : 1 ♂ Nippon (LEZEY leg.) (type). — Coll. ESBEN-PETERSEN : 1 ♂, 1 ♀ Japan (ex coll. MIYAKÉ); 4 ♂, 1 ♀ Japan (ex coll. NAKAHARA)

At first sight this species has very great likeness to *B. laevipes*; but in *nipponicus* the wings are shorter, relatively broader and the tip more obtuse. The best characters to discriminate the two species are, however, the different shape of the anal appendages in the male, and the

presence or absence of the black bristles on the underside of the posterior femora. Both species have the apical margin of the wings narrowly brownish shaded.

[**B. takaoensis** Miyaké] (fig. 139).

Bittacus takaoensis MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, IV, p. 388, pl. 33, fig. 8 (1913) (Japan).

Haplodictyus polemicus NAVÁS, Bull. Mus. d'Hist. naturelle, p. 444, fig. 3 (1914).

Head and rostrum blackish brown. Antennae brown, paler towards the tip. Thorax blackish above with paler lateral margins. Abdomen dark brown above with the hind borders of the segments narrowly blackish; venter pale brown. Wings with a yellowish brown tinge; longitudinal veins brown, cross veins dark brown



FIG. 139. — *Bittacus takaoensis* ♀
Type-specimen of *Haplodictyus polemicus*
(Museum Paris).

and narrowly bordered with brown. Near the tip of Cu^2 a brown spot. Pterostigma opaque, greyish yellow. One Pcv. Frs a little beyond Fm. Scv in the forewing nearer to Frs than to the origin of Rs, but nearest to the origin of Rs in the hindwing. Cuv a little before Fm. No Av. 1A ends a little beyond the origin of Rs. A few strong bristles on the margin of the wings at their base.

Length of forewing : 18,5^{mm}; that of hindwing : 17^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♀ (type-specimen of *Haplodictyus polemicus*) Kumanotaira near Karuizawa (Japan), 26.6.1911 (EDM. GALLOIS leg.).

I consider the species of NAVÁS as a synonym of that of MIYAKÉ, although I only know *B. takaoensis* from the description and the figure. The venation of the wings seems to be quite the same in both species. The only thing in which there seems to be a difference is the colour of the body. MIYAKÉ remarks that the body is totally black, but in the specimen at hand only the dorsum is blackish. I do not attach so much importance to this fact, as the colour of the body in the most species of Mecoptera is very liable to vary, especially when the degree of maturity is taken in to consideration.

[**B. marginatus** Miyaké].

Bittacus marginatus MIYAKÉ, Journ. Coll. Agr. Imp. Univ. Tokyo, p. 389, pl. 37, fig. 3; pl. 33, fig. 10; pl. 31, fig. 10a, 10b (1913) (Japan).

MIYAKÉ, *loc. cit.*

« Body testaceo-ochreous; apex of head in one specimen and ocellar triangle in the other specimen shining black; ocelli pink; eyes blackish or testaceous; antennae ochreous; rostrum in one specimen

testaceous; in one specimen prothorax except the posterior margin and in both specimens mesothorax tinged with piceous; legs fuscous yellow.

Wings pale fuscous yellow, iridescent. origin of r^1 in one specimen spotted with fuscous; the outermost cross veins bordered with fuscous; pterostigma opaque and deeply fuscous; apex of wing clouded with fuscous; veins fuscous; pterostigma jointed with the radial branch by a single cross vein (in one specimen even this single cross vein is obscure).

Abdomen ochreous in one specimen and testaceous in the other; the dorsal appendage of male very conspicuous; it is dorsally erected along the uncus, embracing the latter with its lateral lobes. Length of body: ♂ 11^{mm}, 13^{mm}. — Expanse: 33^{mm}, 35^{mm}. »

Coll. SELYS: not present.

Australian species.

[*B. microcercus* Gerst.] (fig. 140, 141).

Bittacus microcercus GERSTAECKER, Mitt. nat. Ver. Neu-Vorp. Rüg., p. 119 (1885).

Face and rostrum brown. Maxillary palpi brown. Vertex yellow; the ocelli placed in a blackish brown

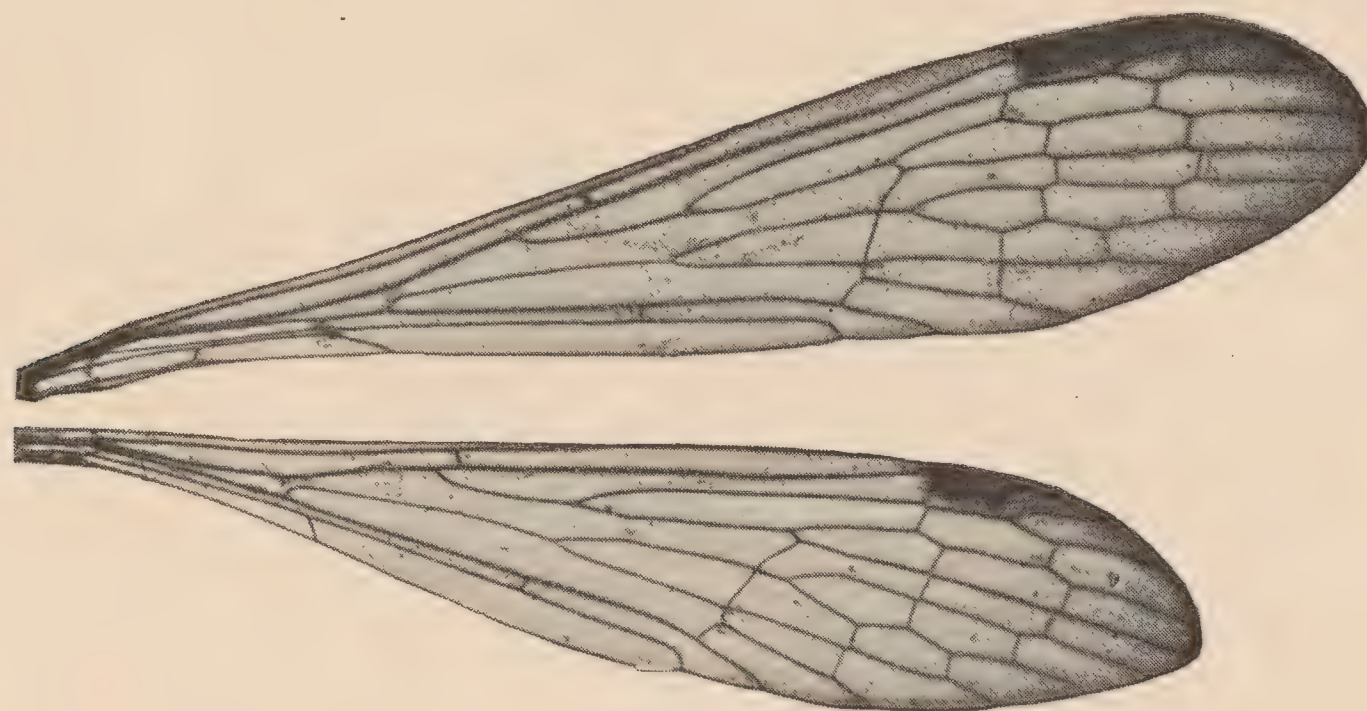


FIG. 140. — *Bittacus microcercus* ♂ type-specimen
(Museum Greifswald).

circular spot. The antennae dark brown; the two basal joints paler. Thorax pale brown. Abdomen brown.

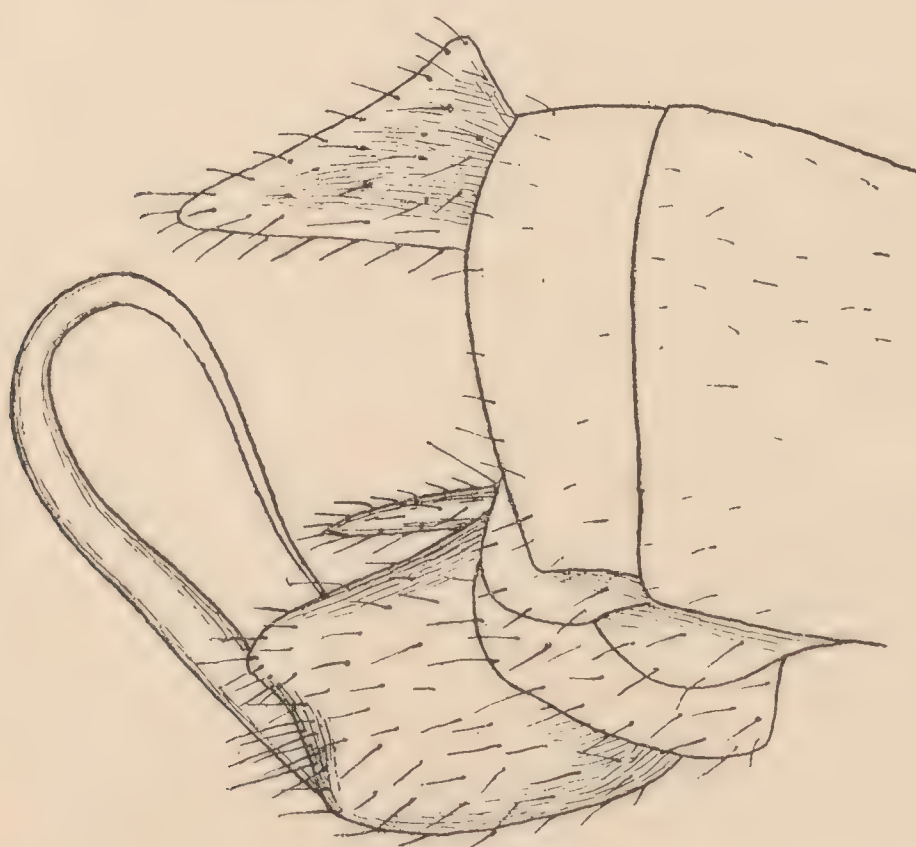


FIG. 141. — *Bittacus microcercus* ♂ type-specimen
Lateral view of anal appendage
(Museum Greifswald).

Anal appendages of male brown. Upper appendage somewhat pointed towards apex, which is bent a little

inwards. Legs brown; tip of femora and tibiae blackish. Wings with yellowish tinge, especially the pterostigma and the front border from the pterostigma to the apex. Veins brown. C blackish from the middle of the wing to apex. A distinct yellowish brown spot at the inner end of pterostigma. Between pterostigma and Rs 2 cross veins in the forewing, 1 in the hindwing.

Forewing : 18^{mm}; hindwing : 16^{mm}.

Coll. SELYS : not present. — Mus. Greifswald : 1 ♂ Peak Downs, Australia (type).

The legs of the species are very slender, and the species has nothing to do with the Australian genus *Harpobittacus*.

African species.

[*B. africanus* Esben-Peters.] (fig. 142).

Bittacus africanus ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 235 (1915).

Head, rostrum and maxillary palpi brown. A blackish spot between the ocelli. Antennae pale brown. Thorax brown with some darker spots along the lateral margins. Abdomen pale brown. Upper appendage of

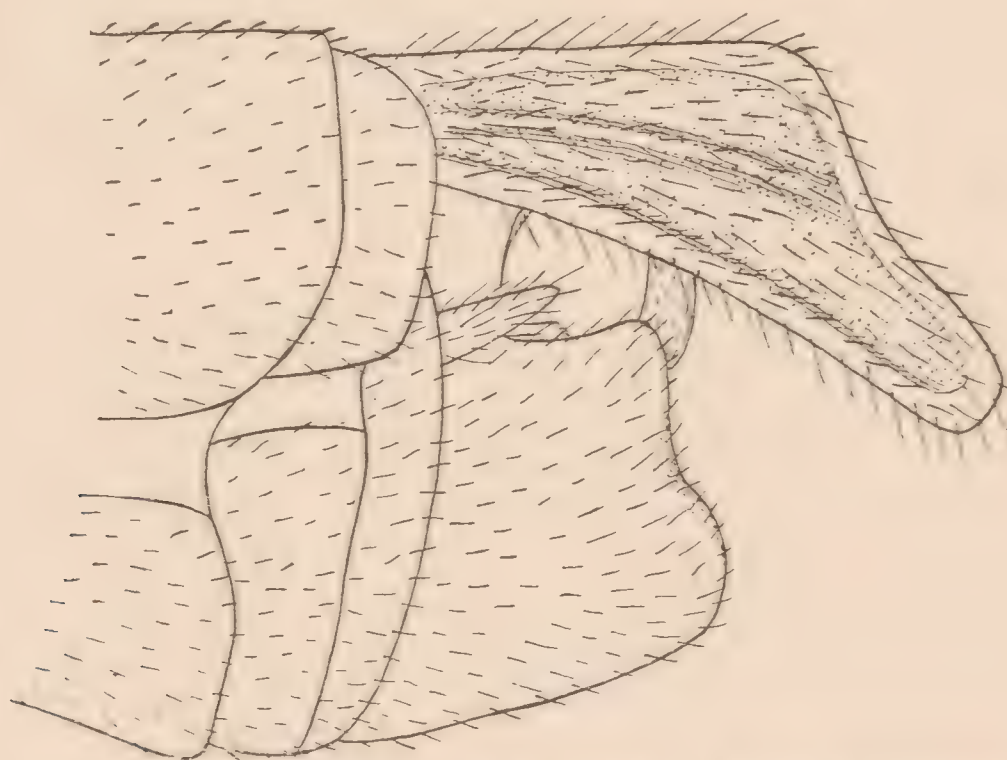


FIG. 142. — *Bittacus africanus* ♂ type-specimen
Lateral view of anal appendages
(Museum Vienna).

male yellowish. Legs yellowish brown; tip of femora and tibiae dark brown. Wings hyaline with a faint yellowish tinge; venation brown; tip somewhat acute. No apical costal cross vein. Scv in forewing nearest to origin of Rs. Frs, Fm and Cuv placed in a straight line. Av before Cuv. 1A joins the hind margin a little before Fm. At Frs a very small dark spot, and at Fm a large white spot. Pterostigma subrectangular, 3 to 3 1/2 times longer than broad, yellowish. Two Pcv present. Bristles on the margins of the wings at base.

Forewing : 19^{mm}; hindwing : 17^{mm}.

Coll. SELYS : not present. — Mus. Vienna : 1 ♂ labelled [Urwald Beni, Oct. 10, GRAUER].

B. Selysi Esben-Peters. (fig. 143) (pl. II, fig. 21).

Bittacus Selysi ESBEN-PETERSEN, Ann. South Afr. Mus., XVII, p. 187, fig. 1, 2 (1917).

Head, rostrum and maxillary palpi yellowish brown; a lateral blackish streak in the basal part of rostrum; between the ocelli a blackish spot. Antennae yellowish brown. Thorax yellowish brown; abdomen yellowish brown at base, becoming shining black at the apex. Legs

yellowish brown; femora with a rather broad blackish brown band at the tip; tibiae with a narrow dark brown band at the tip; tip of tibial joints brown. Wings long and slender with rounded apex. Membrane with shining yellowish tinge and is faintly smoky brownish shaded along the apical margin. Venation brown; cross veins in the apical part faintly shaded with yellowish brown. A rather indistinct yellowish brown spot is found at the place where M separates from Cu^1 , at the origin of Rs and at the forks of Rs and M; the yellowish brown marking at the fork of M encloses a small whitish spot. No apical cross vein in costal area.

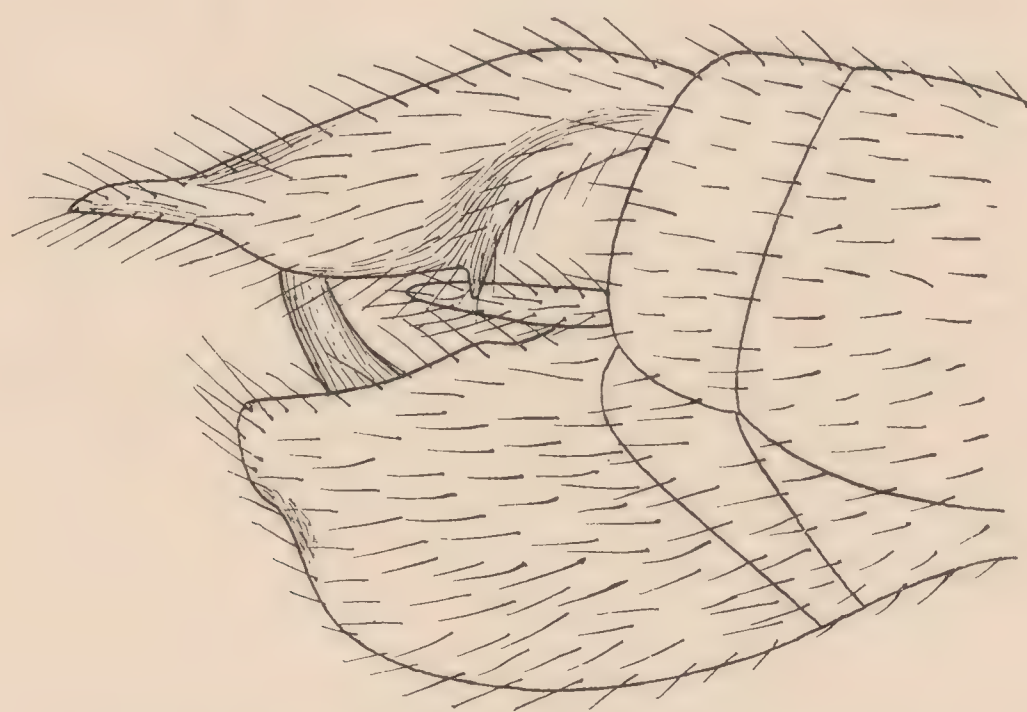


FIG. 143. — *Bittacus Selysi* ♂ type-specimen
Lateral view of anal appendages
(Coll. Selys).

Scv between origin and fork of Rs, in forewing nearest to the fork, in the hindwing nearest to the origin. Fork of Rs a little before fork of M. Cuv a little before fork of M. No Av present. 1A ends about half way between the origin and fork of Rs. Pterostigma distinctly yellowish brown; the colour extends a little beyond R; the form is subrectangular, $1\frac{1}{2}$ times longer than broad; two Pcv present. Black bristles on the margins of wings near base. In the male the branches of upper appendage are strongly pointed towards apex; on the lower margin is found a tooth; the pointed apices of the branches, seen from above, very wide apart.

Forewing : 21^{mm} ; hindwing : 19^{mm} .

Coll. SELYS : 1 ♂, labelled [Port Natal] in the handwriting of H. A. HAGEN (type). — South African Museum : 1 ♂ Durban.

The species has some likeness to *B. montanus*, but the rounded apex of the wings, the shorter pterostigma and the different shape of the anal appendages are good characters in separating the two species. Also the absence of Av may be used.

[*B. montanus* Weele] (fig. 144).

Bittacus montanus WEELE, SJÖSTEDT, Kilimandjaro-Meru Expedition, Neuroptera, p. 21, fig. 4 (1909). — ESBEN-PETERSEN, Revue Zool. Afr., p. 141, fig. 6 (1913). — LESTAGE, Revue Zool. Afr., p. 113, fig. 1-3 (1917).

Head and rostrum yellowish brown; maxillary palpi brown; a black spot between the ocelli; antennae pale brown at base, darker towards tip. Thorax brown; abdomen pale brown. Legs yellowish brown; tip of femora and tibiae black; tarsi brown. Wings rather slender; their tip rounded or somewhat acute. Membrane with yellowish brown tinge; venation brown. No apical cross vein in the costal area; Scv between the origin and fork of Rs, in forewing nearest to the fork, in hindwing nearest to the origin of Rs. Fork of M a

little before fork of Rs. At the fork of M a whitish spot. Cuv opposite to fork of M. Av before Cuv. 1A ends a little before fork of M. Pterostigma yellowish brown, subrectangular, twice or thrice longer than broad;

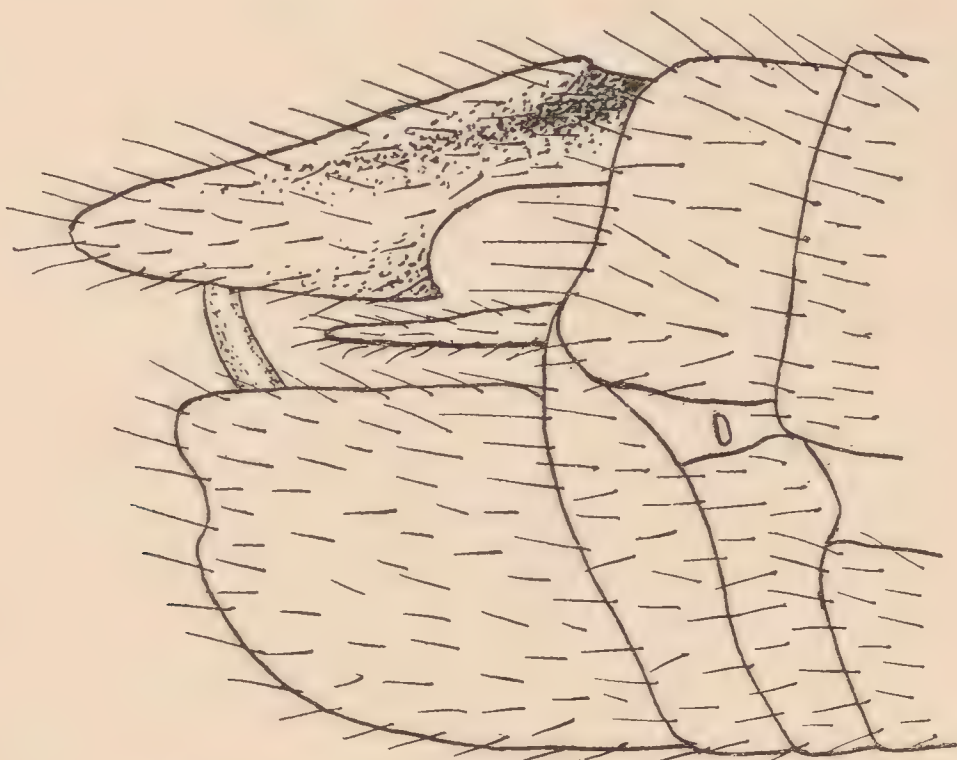


FIG. 144. — *Bittacus montanus* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

two Pcv. Bristles on the margins of wings near base. In the female the subgenital plate provided with strong black bristles.

Forewing : 20-21^{mm}; hindwing : 18-19^{mm}.

Coll. SELYS : not present. — Mus. Congo belge : 1 ♂ collected between Beni and Lessé (Dr. MURTULA leg.). — British Mus. : 3 ♂, 2 ♀ Uganda, Lake Edward (NEAVE leg.); 1 ♂ Mt. Mlanje, Nyassaland (NEAVE leg.); 1 ♂ S. E. Katanga (NEAVE leg.); 1 ♀ Upper Kuja Valley, Brit. E. Africa (NEAVE leg.); 1 ♂ N. E. Rhodesia (NEAVE leg.); 1 ♀ Flala, Brit. E. Africa (NEAVE leg.); 1 ♀ Mt. Elgon, B. E. Africa (NEAVE leg.); 1 ♀ Salisbury, Mashonaland (MARSHALL leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Nyassaland, 1 ♀ Uganda.

The figure of the male appendages, given by WEELE, is hardly quite correct; those given by LESTAGE are much better. In the series from British Museum and in the male from my own collection the dent on the underside of the upper appendages is placed nearer to the base than to the tip, but as they otherwise agree with the male specimen from Museum Congo belge and with the description given by WEELE I consider them to be the same species. The above named dent is sharply pointed and somewhat inwardly directed.

[*B. Sjöstedti* Weele].

Bittacus Sjöstedti WEELE, SJÖSTEDT, Kilimandjaro-Meru Expedition, Neuroptera, p. 22, fig. 5 (1909) (Kilimandjaro).

WEELE, *loc. cit.*

« This species, nearly of the same size and form as *montanus*, is readily distinguished from it by the dark nervature of the wings, which is fuscous, and the crossveins, which are all broadly margined with fuscous. The pterostigma is shorter and nearly semicircular, brown. The tips are angulated as in *testaceus* (Weelei ESB.-PETERS.). There is a round smoky spot at the furcation of the media in both wings. Body brown, the head black, antennae rufous, abdomen with narrow black annulations at the segments. Legs rufous brown with black annulations at femora and tibiae. Tarsi dark brown. Inner tibial spurs about 1^{mm} shorter than the outer. Hind femora thickened in both sexes. Genitalia of the ♂ characterised by the short and broad, nearly hastiform app. sup. The app. inf. are slender and short, the genitalvalve is quadrangular when seen from the under- and lateral side. The penis is of about the same form as in *montanus*, but the tip is somewhat more strongly curved.

Forewing : 20-22^{mm}; hindwing : 17-19^{mm}.

Coll. SELYS : not present.

I have not seen this species, but I am able to give some notes with regard to the venation of forewing. Wings slender, somewhat acute at tip. No apical cross vein. Scv a little before fork of Rs. Fork of M a little

before fork of Rs and with a whitish spot. Cuv a little beyond fork of M. Av much before fork of M. 1A ends a little before fork of M. Pterostigma subrectangular, two or three times longer than broad; two Pcv present. The venation of the wing of this species is quite similar to that in *B. montanus*; but the wing is more pointed at apex.

[**B. Walkeri** Esben-Peters.] (fig. 145, 146).

Bittacus Walkeri ESSEN-PETERSEN, Ent. Medd. Köbenhavn, p. 236 (1915). — ID., Annals South African Mus., p. 189, fig. 3, 4 (1917).

Head, rostrum and maxillary palpi yellowish brown; a blackish cross band between the eyes above the insertion of antennae encloses the ocelli. Antennae blackish brown; the basal joints pale brown. Thorax pale brown; mesothorax with four black spots on its front half; metathorax with two black spots on its front



FIG. 145. — *Bittacus Walkeri* ♂ type-specimen (Museum London).

margin. Abdomen yellowish brown. Femora and tibiae yellowish brown; tip blackish; joints of fore and intermediate tarsi brown, becoming blackish brown towards the tip; joints of hind tarsi dark brown, blackish towards apex. Hind femora rather incrassate in the middle. First joint of hind tarsus as long as second and

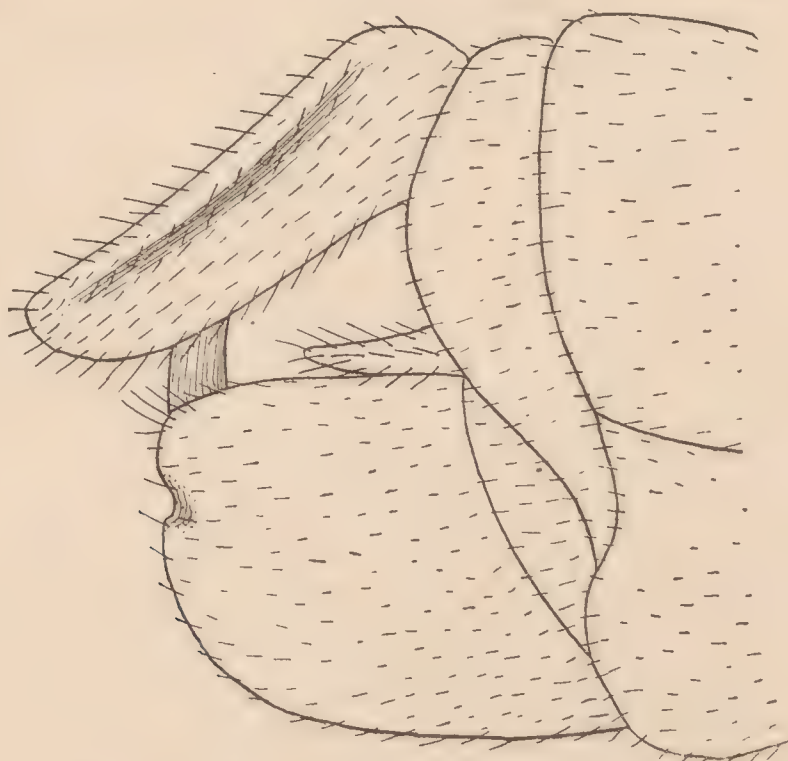


FIG. 146. — *Bittacus Walkeri* ♂ Lateral view of anal appendages (Museum London).

third joint together, which are equal; fourth joint two thirds of first; fifth joint as long as fourth; claw very small. Wings very long and slender with elliptical apex. Membrane hyaline, hardly with any yellowish tinge; venation dark brown, in the apical part of wings narrowly margined with brown. No apical cross vein in costal area. Scv between origin and fork of Rs, in forewing nearest to the fork, in hindwing nearest to origin of Rs. Fork of Rs before fork of M. Cuv opposite to fork of Rs. Av far before Cuv. 1A joins the margin a little before Cuv and fork of Rs. Pterostigma subrectangular, about 6 times longer than broad, strongly purple-brown; two Pcv present. Bristles on the margins of wings near the base.

Forewing : 24^{mm}; hindwing : 22^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♂ (type-specimen) labelled [388] [Dr. SMITH S. Afr. 44-6] [One of WALKER's series so named *B. capensis*]. — South African Museum : 1 ♂ Krantz kloof, Natal (MARLEY leg.).

In the form of the wings this species has much likeness to the species of *Harpobittacus* and to *B. chlorostigma*, but the wings are relatively more slender.

B. testaceus Klug (fig. 147, 148).

Bittacus testaceus KLUG, Abh. Königl. Akad. Wiss. Berl., p. 98 (1836). — WALKER, Cat., Neur. Ins. Brit. Mus., p. 466 (1853). — ENDERLEIN, Zool. Anz., p. 398 (1910). — ESBEN-PETERSEN, Rev. zool. Afr., p. 139, fig. 2 (1913). — BANKS, Trans. Ent. Soc., XXXIX, p. 234 (1913).

Head, rostrum and maxillary palpi yellowish brown; between the ocelli a black spot. Antennae brown; the two basal joints stouter and paler. Thorax brown; abdomen pale brown.

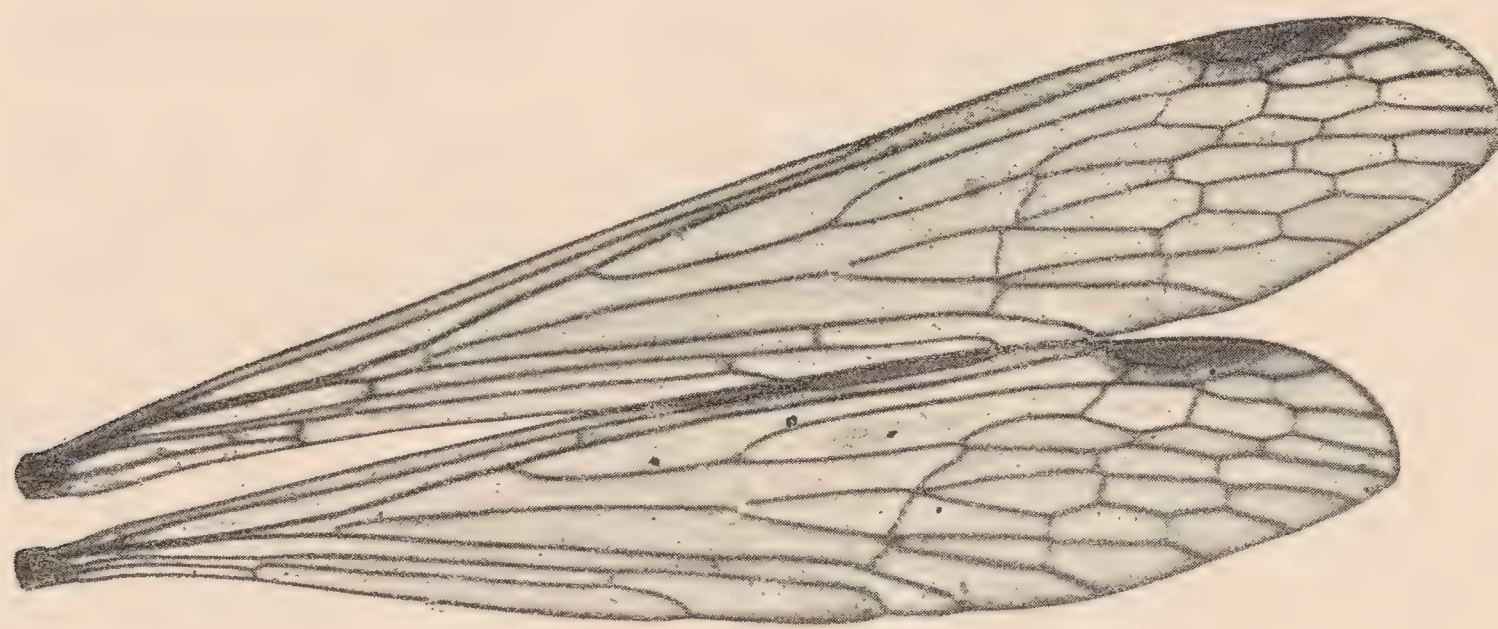


FIG. 147. — *Bittacus testaceus* ♂
(Museum Stockholm).

Legs brown; tip of tibiae and of tarsal joints a little darker. Wings long and slender with rounded tip. Membrane with faint yellowish brown tinge; venation brown. No apical cross vein

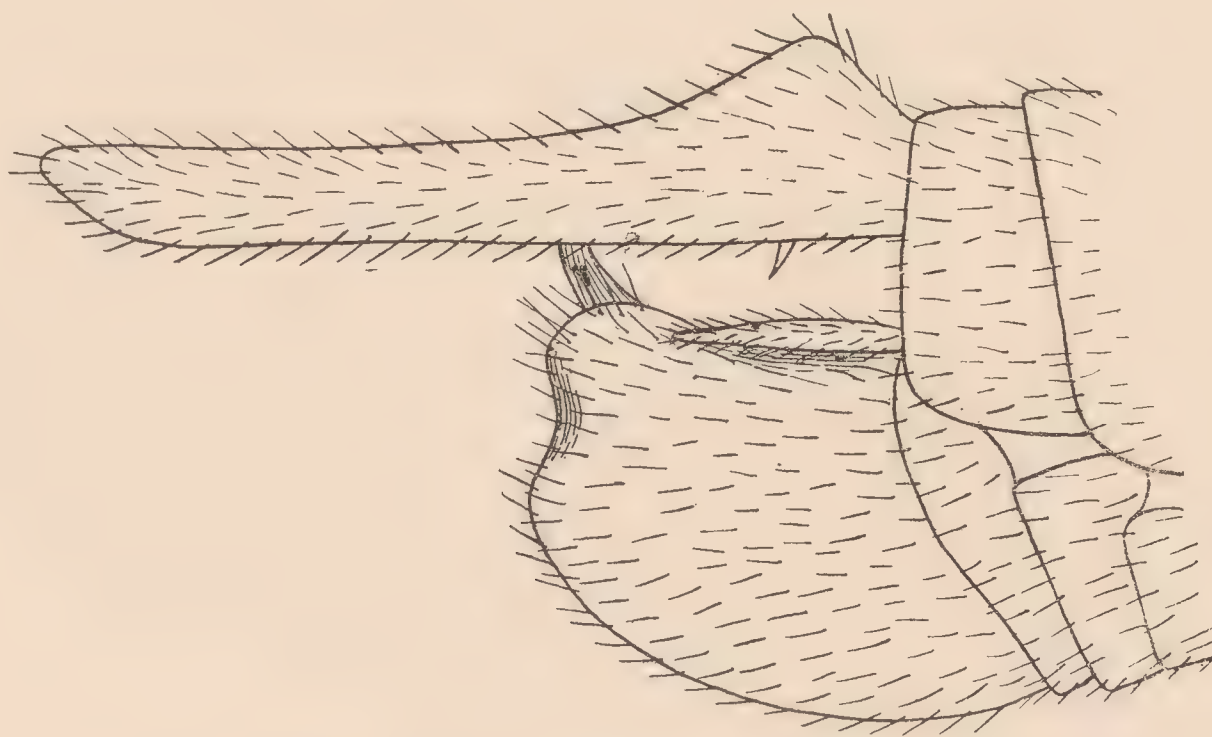


FIG. 148. — *Bittacus testaceus* ♂
Lateral view of anal appendages
(Museum Stockholm).

in costal area; Scv between origin and fork of Rs. Fork of Rs a little before fork of M. Cuv a little before fork of Rs. Av before Cuv. 1A ends opposite to Cuv or a little before. Pterostigma subquadrate, 2 1/2 times longer than broad, strongly yellowish brown; two Pcv. Bristles on the

margins of wings near base. In the male the branches of upper appendage very long and straight, almost twice as long as the claspers.

Forewing : 22-23^{mm}; hindwing : 20-21^{mm}.

Coll. SELYS : 1 spec. (abdomen lost) (Natal). — Brit. Mus. : 1 ♂ Estcourt, Natal (WROUGHTON leg.); 1 ♂ Knysna, S. Afrika. — Mus. Stockholm : 1 ♂, 1 ♀ Caffraria (WAHLBERG leg.). — South Afr. Mus. : 2 ♂ Barbenton, Transvaal (EDWARDS leg.). — Durban Mus. : 1 ♂ Amanlimtoti. — Coll. ESBEN-PETERSEN : 1 ♂ Caffraria.

In the specimen from Estcourt, Natal (Brit. Mus.) Av is not present.

[**B. Schoutedeni** Esben-Peters.] (Fig. 149).

Bittacus Schoutedeni ESBEN-PETERSEN, Rev. zool. Afr., p. 143, fig. 9, 10 (1913).

Bittacus montanus LESTAGE, Revue zool. Afr., p. 113 (1917).

Head and rostrum brown; the latter darker towards the tip; maxillary palpi brown. Between the ocelli a black spot. Antennae brown, blackish towards tip. Thorax brown; abdomen pale brown. Legs pale brown; tip of femora, tibiae and of tarsal joints blackish brown. Wings slender, tip elliptical. Membrane hyaline with

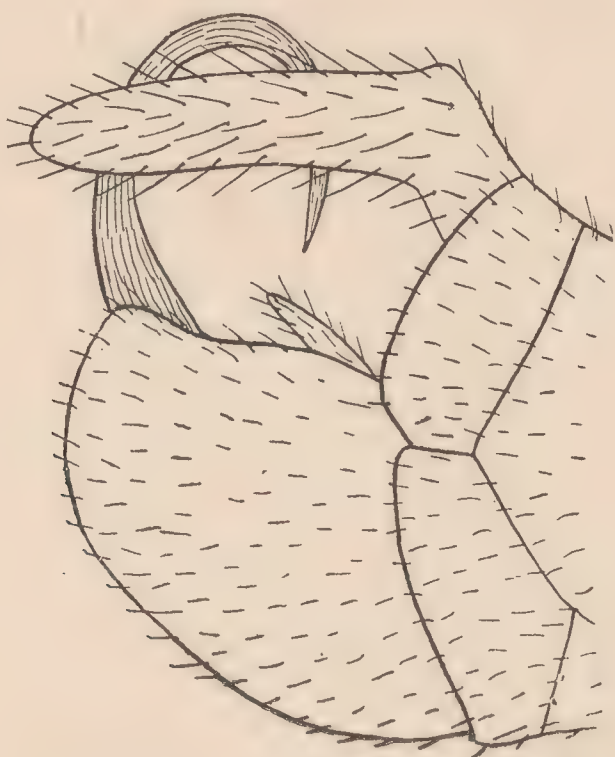


Fig. 149. — *Bittacus Schoutedeni* ♂ type-specimen
Lateral view of anal appendages
(Museum Congo belge).

faint yellowish tinge. Venation brown. No apical cross vein in costal area. Scv half way between origin and fork of Rs. Fork of M a little before fork of Rs and with a whitish spot. Cuv before fork of M. Av before Cuv; 1A ends a little before Cuv. Pterostigma subrectangular, pale greyish brown; two Pcv. Bristles on the margins of wings near base. Branches of upper appendage somewhat pointed at the apex. Claspers rounded at the apex, not incised.

Forewing : 17-19^{mm}; hindwing : 15,5-17^{mm}.

Coll. SELYS : not present. — Mus. Congo belge : 1 ♂, 1 ♀ 345 km from Kindu (Dr. RUSSO leg.) (types). — Coll. ESBEN-PETERSEN : 1 ♂ (immature) Mufunga (Dr. BEQUAERT leg.).

In the shape and venation of wings this species is nearly allied to *B. testaceus* KLUG; but the more pointed apex of the wings and the different anal appendages of the male separate it from the latter. In the centre of the basal part on the innerside of the upper appendages is found a strong inwardly directed dent, but it is not visible by lateral view.

B. capensis Thunb. (fig 150, 151).

Panorpa capensis THUNBERG, Nov. Sp. Ins. Diss., III, p. 67, fig. 78 (1784).

Bittacus capensis KLUG, Abh. Kön. Akad. Wiss. Berl., p. 97 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 465 (1853). — ESBEN-PETERSEN, Revue zool. Afr., p. 138 (1913). — BANKS, Trans. Am. Ent. Soc., XXXIX, p. 234 (1913).



FIG. 150. — *Bittacus capensis* ♂
(Museum Vienna).

Head and rostrum brown; the apical half of rostrum and a broad streak between the eyes black; the latter encloses the ocelli and the insertion of antennae. Maxillary palpi brown; tip

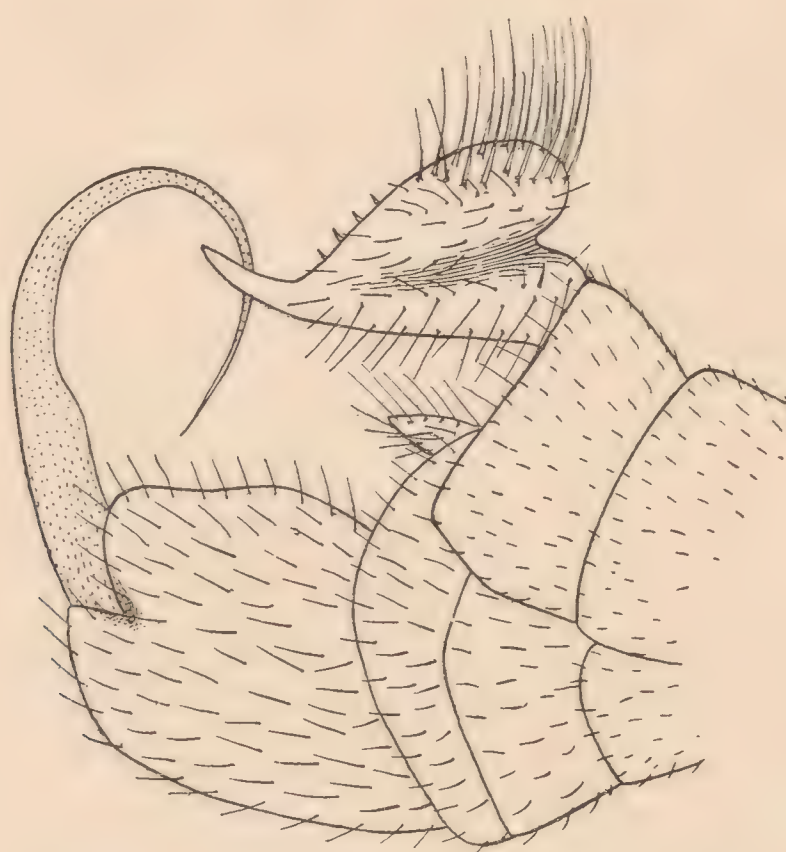


FIG. 151. — *Bittacus capensis* ♂
Lateral view of anal appendages
(Museum Vienna).

of apical joint blackish. Antennae dark brown. Thorax brown with two lateral black streaks. Abdomen brown. Legs brown; tip of femora, tibiae and 1st tarsal joint blackish; the remainder of tarsal joints blackish. Wings long and slender with elliptical tip and strong yellowish brown tinge. Venation dark brown. No apical cross vein in costal area. Scv a little beyond origin of Rs (in hindwing nearer to the origin of Rs). Fork of Rs opposite to fork of M. Cuv a little before fork of M. Av near to the tip of 1A, which joins the margin a little before Cuv. Pterostigma subtriangular, twice as long as broad, yellowish brown. As a rule two Pcv. A few bristles on the margins of the wings near base. In the male the branches of upper appendage broad at base and narrowed towards the tip, which is strongly pointed.

Forewing : 18^{mm}; hindwing : 16^{mm}.

Coll. SELYS : 1 ♂ Cape. — Mus. Vienna : 1 ♂ Algoa Bay (Dr. BRAUNS leg.). — Mus. Hamburg : 1 ♂ Algoa Bay (Dr. BRAUNS leg.).

[**B. Pobeguini** Navás] (fig. 152, 153).

Haplodictyus Pobeguini NAVÁS, Mem. Real Acad. Cienc. Art. Barcelona, p. 414, fig. 16 (1908).

Bittacus Pobeguini ESBEN-PETERSEN, Revue zool. Afr., p. 140, fig. 4, 5 (1913).

Bittacus (Haplodictyus) moschinus NAVÁS, Afrique orientale. Planipennia et Mecoptera, p. 49, fig. 25 (1914) (Kilimandjaro).

Head and rostrum brown; maxillary palpi dark brown. A black spot between the ocelli. Antennae pitchy brown; the two basal joints pale brown. Thorax brown; abdomen pale brown. Fore femora pitchy black in the apical and brown in the basal part. Intermediate and hind femora and all the tibiae brown with

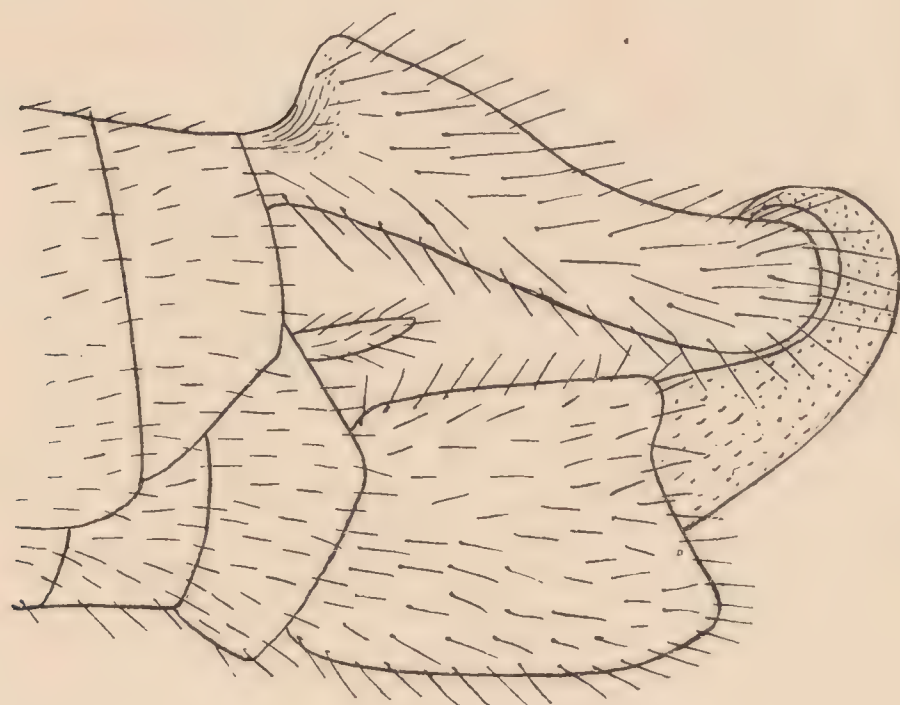


FIG. 152. — *Bittacus Pobeguini* ♂
Lateral view of anal appendages
(Museum London).

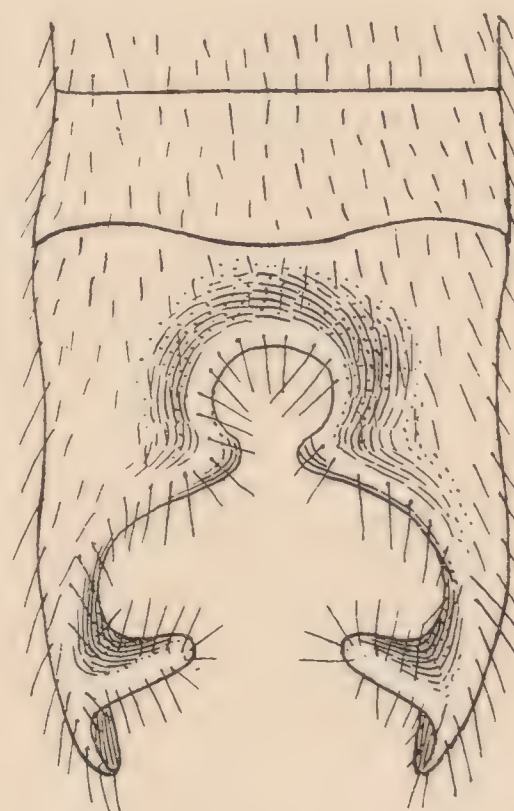


FIG. 153. — *Bittacus Pobeguini* ♂
Dorsal view of upper appendages
(Museum London).

a rather broad black band at tip. Wings with acute tip and smoky tinge, especially along the front margin and the apex. Venation dark smoky brown; the apical cross veins beyond the first row very indistinct. No apical cross vein in costal area. Scv nearer to the origin than to fork of Rs. Fork of Rs a little before fork of M. Cuv as a rule opposite to fork of M. No Av. 1A ends opposite to fork of M. No bristles on the margins of wings. Pterostigma subtriangular, 3 to 4 times longer than broad, smoky brown; one Pcv.

Forewing : 16-17^{mm}; hindwing 15-16^{mm}.

In « Revue Zool. Afr., p. 140, fig. 4 », I have given a sketch of the anal appendages of the male from a specimen in Mus. Congo belge. The anal parts of the specimen were somewhat shrivelled, and the sketch of the branches of upper appendage is on that account incorrect.

The species has been used by NAVÁS as type-species for his genus *Haplodictyus*, mainly based upon the presence of subtriangular pterostigma. It is not correct to base a new genus upon such varying character which may be a rather good specific « first sight » character but not of generic value.

[**B. Peringueyi** Esben-Peters.] (fig. 154, 155).

Bittacus Peringueyi ESBEN-PETERSEN, Revue zool. Afr., p. 144, fig. 11 (1913).

Head, rostrum and maxillary palpi yellowish brown. A black spot between the ocelli. Antennae brown, basal joints yellowish brown. Thorax brown; abdomen yellowish brown at base and becoming darker towards apex. Legs yellowish brown, tip of femora and tibiae blackish. Hind femora rather stout. Wings broad and

strongly rounded at tip, hyaline with a faint yellowish tinge. Venation yellowish brown, distinct. No apical cross vein in the costal area. Scv nearer to the origin than to the fork of Rs. Fork of Rs opposite to fork of

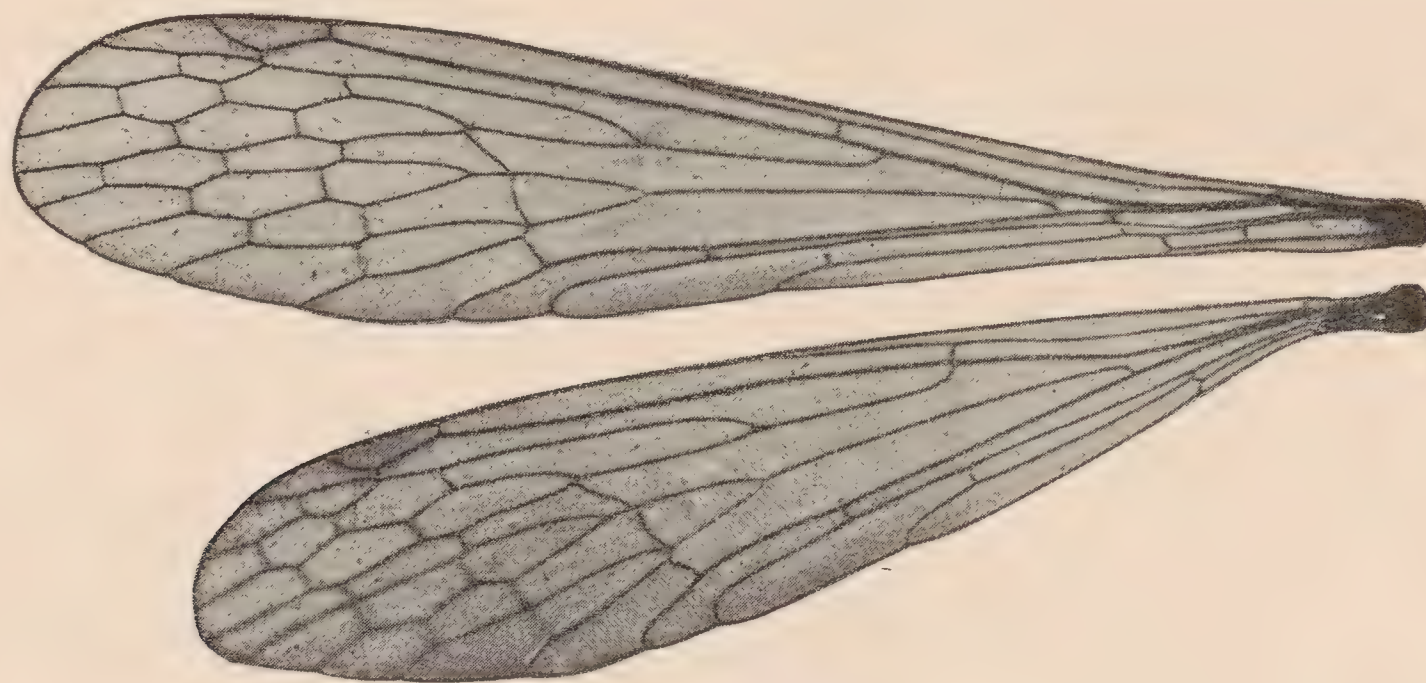


FIG. 154. — *Bittacus Peringueyi* ♂ type-specimen
(Museum South Afr., Capetown).

M. Cuv before fork of M. Av much before Cuv. 1A joins the hind margin before Cuv and fork of M. Pterostigma yellowish, subtriangular, twice to three longer than broad; one Pcv (sometimes there may be two).

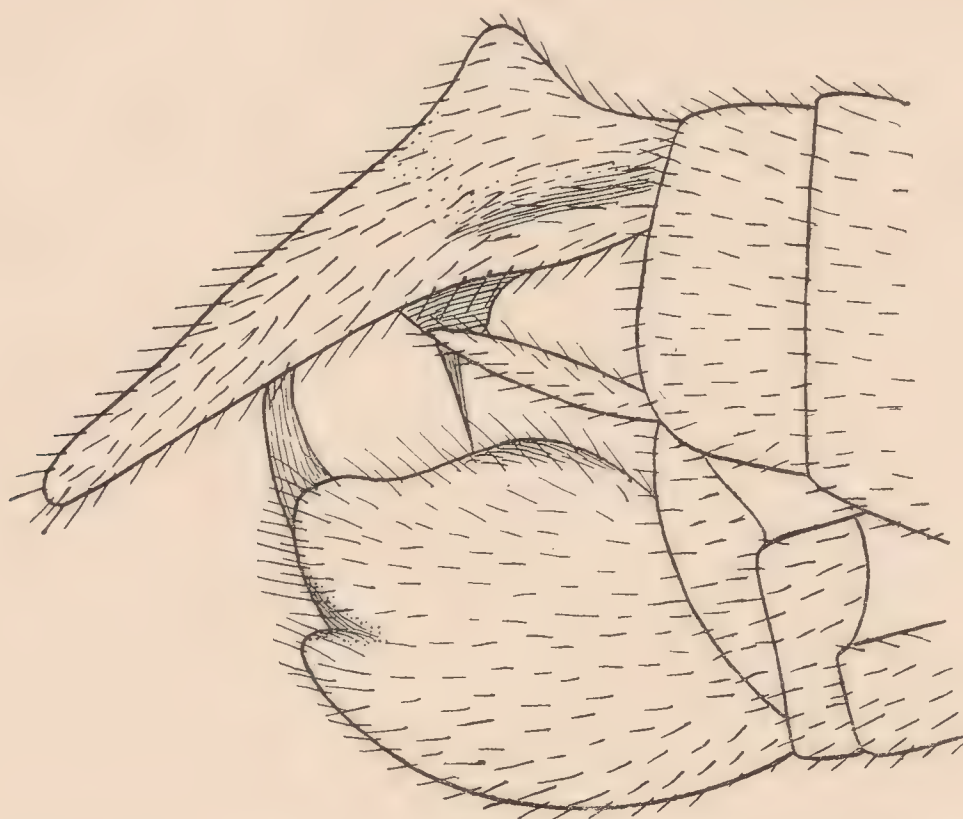


FIG. 155. — *Bittacus Peringueyi* ♂ type-specimen
Lateral view of anal appendages
(Museum South Afr., Capetown).

Bristles on the margin of the wings near base. In the male the branches of upper appendage narrowed towards base, with almost straight margins; their lower margin with a large, blunt and downwardly directed dent on the inner side.

Forewing 21-24^{mm}; hindwing : 19-22^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♂, 1 ♀ Estcourt, Natal (WROUGHTON leg.); 3 ♀ Natal (CREGOE leg.). — South Afr. Mus. : 1 ♂ kg. Wm's F. Dist. St. Nathew's. Apr. 1894 (LIGHTFOOT leg.) (type).

[**B. Chevalieri** Navás] (fig. 156).

Haplodictyus Chevalieri NAVÁS, Mem. Real Acad. Cienc. Art. Barcelona, p. 414, fig. 17 (1908).

Bittacus Chevalieri ESBEN-PETERSEN, Revue zool. Afr., p. 139, fig. 3 (1913).

Head, rostrum and maxillary palpi yellowish brown; rostrum a little darker towards apex. Between the eyes an oblong, transversely placed depression, brimmed with a row of bristles. A black spot between the ocelli. Antennae pale brown at the base, dark brown towards apex. Thorax pale brown; abdomen pale greyish brown. Legs yellowish brown; tip of femora and tibiae blackish. Wings pale greyish brown; smoky

brown at the apex; longitudinal veins darker and very distinct; the cross veins paler. No apical cross veins in the costal area. Scv nearly opposite to fork of Rs; in the hindwing before the fork. In the forewing the fork of Rs opposite to fork of M, in the hindwing fork of Rs a little before fork of M. Cuv opposite to fork of M.



FIG. 156. — *Bittacus Chevalieri* ♀
(Museum Vienna).

No Av. 1A joins the hind margin a little before fork of M. Pterostigma subtriangular or subrectangular, twice as long as broad, smoky brown; one or two Pcv. Bristles on the margin of wings near base.

Forewing : 16^{mm}; hindwing : 14^{mm}.

Coll. SELYS : not present. — Mus. Paris : 1 ♀ Obok, named by NAVÁS. — Mus. Vienna : 1 ♀ Afrika.

It is the smallest species of *Bittacus* from Africa. The specimen from Mus. Paris is one of the types of NAVÁS; the pterostigma in its right forewing is connected with R² by two cross veins. In the specimen from Mus. Vienna there are two Pcv in all wings except left hindwing.

[**B. fumosus** Esben-Peters.] (fig. 157).

Bittacus fumosus ESBEN-PETERSEN, Revue zool. Afr., p. 145, fig. 12 (1913).

Head brown; rostrum darker towards tip; maxillary palpi dark brown; a blackish spot between the ocelli. Antennae brown; the two basal joints paler. Thorax and abdomen brown. Legs brown, tip of femora, tibiae and of tarsal joints blackish. Hind femora rather slender. Wings rather broad in their apical part with

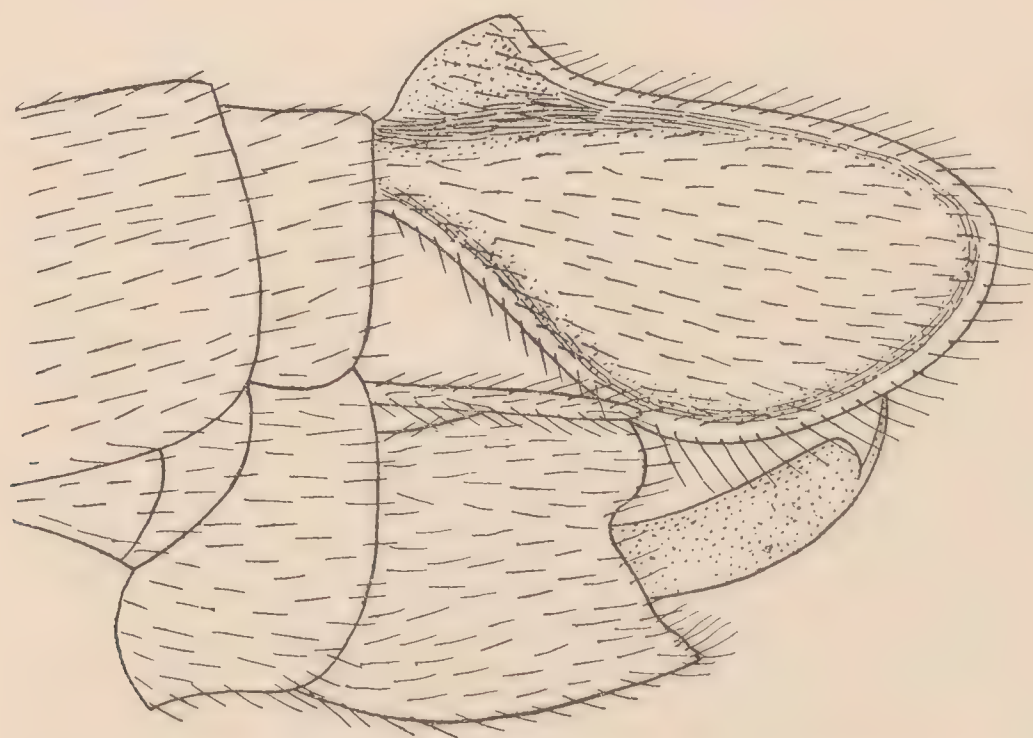


FIG. 157. — *Bittacus fumosus* ♂ type-specimen
Lateral view of anal appendages
(Museum London).

elliptical apex. Membrane hyaline yellowish with sooty brown tinge and with a slightly sooty brown shadow along the apical margin, especially in ♀. Venation blackish brown, very distinct, especially at tip. No apical cross vein in costal area. Scv in forewing beyond the fork of Rs, in the hindwing before. Fork of Rs opposite to fork of M in forewing, but a little before in hindwing. Cuv a little beyond fork of M. No Av. 1A ends in

forewing somewhat before Cuv. Pterostigma subrectangular, thrice longer than broad, sooty brown; two Pcv. Bristles on the hind margin of wings near base.

Forewing : 20-24^{mm}; hindwing : 17-21^{mm}.

Coll. SELYS : not present. — Mus. Stockholm : 1 ♀ Brit. E. Africa (LINDBLOM leg.) (type). — Brit. Mus. : 1 ♂ Kitui, Brit. E. Africa (SCHOKFIELD leg.) (type).

At first sight this species has much likeness to *B. Weelei* as to the shape of the wings and the dark venation, but its shorter pterostigma, darker membrane and the quite different shape of anal appendages in the male easily separate the two species. In the male-specimen the apex of the wings and the pterostigma are not so strongly coloured as in the female-specimen, which seems to be more aged than the male.

B. nebulosus Klug (fig. 158, 159).

Bittacus nebulosus KLUG, Abh. Königl. Akad. Wiss. Berl., p. 99 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 467 (1853). — ESBEN-PETERSEN, Revue zool. Afr., p. 138, fig. 1 (1913). — BANKS, Trans. Ann. Ent. Soc., XXXIX, p. 233 (1913).



FIG. 158. — *Bittacus nebulosus* ♂
(Coll. Esben-Petersen).

Head, rostrum and maxillary palpi yellowish brown. A black spot between the ocelli. Antennae yellowish brown. Thorax brown; abdominal segments brown with narrow, dark hind

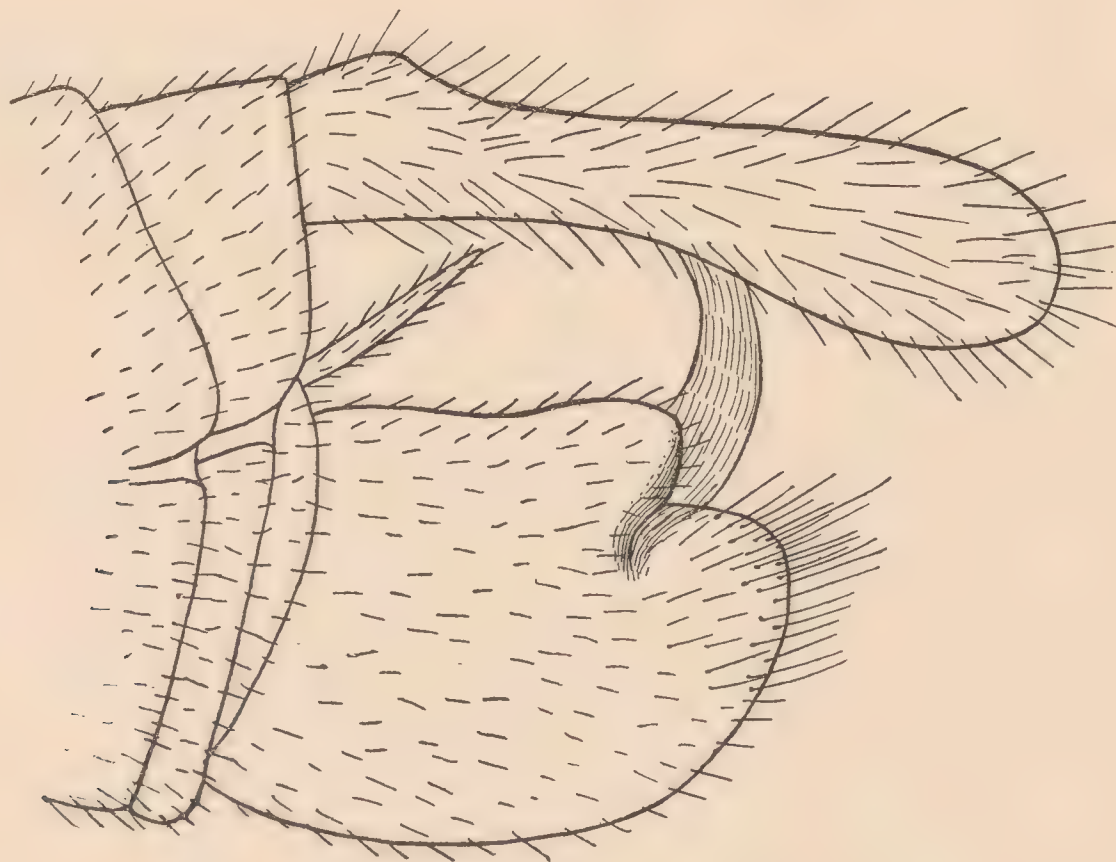


FIG. 159. — *Bittacus nebulosus* ♂
Lateral view of anal appendages
(Museum Stockholm).

border; terminal segments dark. Legs yellowish brown; tip of femora and tibiae black. Wings

rather broad, their tip rounded. Membrane with strong yellowish tinge; venation brown; cross veins in the apical part pale brownish shaded; at the origin and at the fork of Rs a pale brown spot; at the fork of M a small whitish spot. An apical cross vein in the costal area a little beyond fork of Rs, Scv far beyond. Fork of Rs opposite to fork of M; in the hindwing perhaps a little before. Cuv before fork of M. No Av. 1A ends beyond fork of M. Pterostigma strongly yellowish, subrectangular, four times longer than broad; two Pcv. Long bristles on the margin of the wings near base.

Forewing : 26-28^{mm}; hindwing : 24-25^{mm}.

Coll. SELYS : 1 ♂ Natal; 1 spec. (abdomen lost). — Mus. Stockholm : 2 ♂, 1 spec. without abdomen, Caffraria (WAHLBERG leg.). — South Afr. Mus. : 1 ♂, 1 ♀ Barberton, Transvaal (EDWARDS leg.). — Durban Mus. : 1 ♂, 1 ♀ Umbilo. — Coll. ESBEN-PETERSEN : 1 ♂ South Africa.

[**B. Weelei** ESBEN-PETERSEN] (fig. 160).

Bittacus Weelei ESBEN-PETERSEN, Revue zool. Afr., p. 142, fig. 7, 8 (1913). — LESTAGE, Revue zool. Afr., p. 112 (1917).

Bittacus testaceus WEELE, SJÖSTEDT, Kilimandjaro-Meru Expedition, Neuroptera, p. 21, fig. 3 (1909).

Bittacus negus NAVÁS, Mem. Acad. Cienc. Art. Barcelona, p. 397 (1915).

Head brown; between the ocelli a black spot. Rostrum brown at base, black at tip. Maxillary palpi brown. Antennae black; two basal joints brown. Thorax brown; abdomen yellowish brown, brown towards apex. Legs brown; tip of femora and tibiae darker. 1st joint of hind tarsus as long as 2nd and 3rd together,

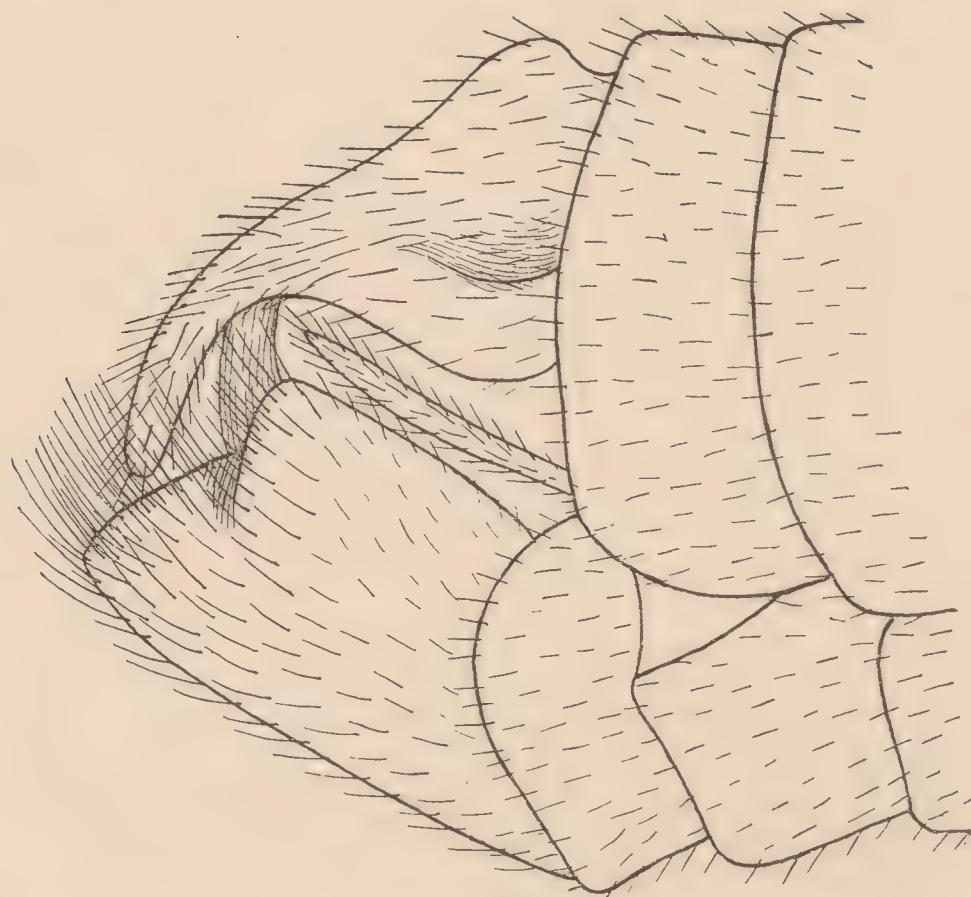


FIG. 160. — *Bittacus Weelei* ♂ type-specimen
Lateral view of anal appendages
(Museum Stockholm).

and hardly one fourth longer than 4th. Wings long and rather slender, elliptical at tip. Membrane pale smoky brown; venation dark brown. No apical cross vein in costal area. Scv near the tip of Sc, about half way between origin and fork of Rs. Fork of Rs opposite to that of M. Cuv opposite to fork of M. No Av. Pterostigma rectangular, nearly 8 times longer than broad, yellowish brown. Bristles on the margins of the wings near base.

Forewing : 24-30^{mm}; hindwing : 20-26^{mm}.

Coll. SELYS : not present. — Mus. Stockholm : 1 ♂, 1 ♀ Kilimandjaro (SJÖSTEDT leg.) (types); 1 ♀ Congo (DANNFELT leg.). — Mus. Congo belge : 1 ♂, 1 ♀ Katanga (BUTTGENBACH leg.). — Brit. Mus. :

2 ♂, 1 ♀ Uganda (NEAVE leg.); 1 ♀ Nyassaland (NEAVE leg.). — Mus. Vienna : 1 ♀ Tanganika Lake (GRAUER leg.). — Coll. ESBEN-PETERSEN : 1 ♀ Congo belge.

It is a good and distinct species, easily recognized by its dark wings, long and narrow pterostigma and the anal appendages of the male.

[**B. oreinus** Navás].

Bittacus oreinus NAVÁS, Mem. Pontif. Accad. Rom., p. 89, fig. 6 (1914). Aethiopia merid.

NAVÁS, *loc. cit.* :

« Similis *montano* WEELE. Testaceus. Caput macula nigra inter ocellos; prostomate stria longitudinali laterali ad apicem confluente, nigra; palpis maxillaribus fuscis, labialibus ferrugineis. Thorax superne testaceo-ferrugineus. Prothorax margine antico rotundato, fusco. Abdomen testaceum, apicem versus obscurius. Pedes gracilis, apice femorum, tibiaram et articulorum tarsorum fusco. Alae (fig. 6) membrana leviter fulvo tincta, ad stigma et pone stigma obscurius; reticulatione ferruginea; thyridio pallido, lato; pupillis solum sub lente visibilibus; stigmatibus duabus venulis cum ramo anteriore sectoris radii conjuncto; vena axillari prima (fig. 6, ax. 1) ad marginem ante vel ad primam furcam sectoris radii et thyridium veniente, apice fere ad $\frac{3}{4}$ inter apicem axillaris secundae et postcubiti; area postcubitali 3 venulis, 2 ante medium, tertia prope apicem venae axillaris; vena axillari secunda una venula cum praecedente conjuncta, ad apicem.

Long. corp. : ♀ 16,5^{mm}; al. ant. : 20,5^{mm}; al. post. : 19,3^{mm}. »

Coll. SELYS : not present.

I do not know this species, which seems to be closely allied to or probably the same as *B. montanus*. By the kindness of Mr. LESTAGE I have had the pleasure of seeing a photo of the right forewing of the type specimen (Mus. Paris), and the only difference I can find between the two species as to the venation is the absence of the basal (second) cross vein between 1A and 2A in the wing of *B. oreinus*.

[**B. Alluaudi** Navás].

Bittacus Alluaudi NAVÁS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia* et *Mecoptera*, p. 45, fig. 20 (1914). (Afrique Orientale Anglaise et Allemande.)

NAVÁS, *loc. cit.* :

« Testaceus. Caput subtotum fuscum, ocellis prominulis; prosostomate leviter arcuato, basi testaceo; occipite testaceo; oculis fuscis; antennis fuscis. Thorax testaceus, superne stria longitudinali laterali fusca ad mesonotum. Abdomen testaceum, primis segmentis apice fusco marginatis; cercis ♂ grandibus, subquadrangularibus, oblongis, flavidis, apice fusco marginatis; copulatore elongato, exerto, flavido; lamina subgenitali a latere visa ad apicem externe, superne ad basim emarginata, inferne convexa. Pedes testacei, femoribus anticis in tertio basilari testaceis; in reliquo fuscis; ceteris et tibiis apice fuscis; calcaribus testaceis, tarsis ferrugineis, posterioribus apicem versus fusciscentibus. Alae membrana fulvo tincta, obscurius ad apicem, seu ab apice ad stigma inclusive; reticulatione ferruginea; stigmatibus oblongo, pentagonali, postice duabus venulis cum ramo sectoris radii conjuncto; thyridio pallido, anguloso; pupillis pallidis, solum sub lente visibilibus; vena axillari prima ad marginem veniente ante thyridium et bifurcationem sectoris, fere ad $\frac{3}{5}$ inter apicem axillaris secundae et postcubiti.

Long. corp. : ♂ 18^{mm}; long. al. ant. : 21,5^{mm}; long. al. post. : 19^{mm}. »

Coll. SELYS : not present.

[**B. Jeanneli** Navás].

Bittacus Jeanneli NAVÁS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia* et *Mecoptera*, p. 46, fig. 21 (1914) (Afr. Orientale Anglaise).

NAVÁS, *loc. cit.* :

« Testaceus. Similis *Alluaudi* NAV., minor, pallidior. Caput vertice fornicato, macula fusca inter ocellos; prosostomate superne ferrugineo, nitido; palpis maxillaribus ferrugineis; oculis fuscis; antennis testaceis, apicem versus ferrugineis. Thorax testaceus, haud fusco striatus. Abdomen testaceo-flavum, primis

segmentis superne linea angusta fusca in margine postico et striâ laterali longitudinali ferruginea parum definita; cercis superioribus ♂ laminaribus, quadrangularibus, flavidis, margine superiore recto, inferiore leviter convexo, apice oblique truncato, fusco leviter marginato; lamina subgenitali convexa, apice acuta, a latere visa postice emarginata, margine superiore subrecto; copulatore exerto, cylindrico. Pedes graciles, testacei, apice femorum et tiliarum fusco; tarsis ferrugineis, articulo primo posteriorum ceteris simul sumptis longitudine aequali aut eis longiore. Alae membrana leviter fulvo tincta, ad marginem apicalem et externum distinctius reticulatione; fuscescente; thyridio albo, elliptico; pupillis parum sensibilibus; area postcubitali una venula ad medium; vena axillari prima ad marginem veniente ante furcam sectoris radii et thyridium, fere ad $\frac{3}{5}$ inter apicem axillaris secundae et postcubiti.

Long. corp. : ♂ 14^{mm}; long. al. ant. : 16,5^{mm}; long. al. post. : 14^{mm}. »

Coll. SELYS : not present.

I do not know these two East African species; but it seems to me that they may be good and distinct species. The two figures, showing the anal appendages of the males in lateral view, are very remarkable. Between the branches of the upper appendage is seen a long and erected prolongation. I do not understand what it is, and NAVÁS does not give any description of it. I have not seen anything like that in the Bittacidae.

[**B. aequalis** Navás].

Bittacus aequalis NAVÁS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia* et *Mecoptera*, p. 47, fig. 22a, 22b (1914) (Afr. Orient. Anglaise).

NAVÁS *loc. cit.* :

« Testaceus. Caput macula inter ocellos et oculis fuscis; palpis maxillaribus fortibus, prosostoma excedentibus; prosostomate mediocri, vix arcuato, attenuato. Abdomen ♂ cercis cylindrico-conicis, dente inferno prope basim longo; lamina subgenitali grandi, convexa. Alae membrana leviter fulvo tincta, ad apicem, maxime ad marginem, leviter fusco suffusa; reticulatione fusca, venulis plerumque pallidioribus; stigmati pentagonali, 2 venulis cum ramo sectoris radii connexo, fuscescente; thyridio pallido, mediocri; pupillis fuscis, distincte visibilibus; vena axillari prima longe a thyridio ad marginem veniente, in ala anteriore propius ad apicem axillaris secundae quam ad apicem postcubiti, in ala posteriore vice versa, paulo propius ad apicem postcubiti quam axillaris secundae; 2 venulis postcubitalibus in ala anteriore, ad medium et prope basim venae axillaris.

Long. corp. : ♂ 17^{mm}; long. al. ant. : 19^{mm}; long. al. post. : 17^{mm}. »

Coll. SELYS : not present.

[**B. discors** Navás].

Bittacus discors NAVÁS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia* et *Mecoptera*, p. 47, fig. 23a, 23b (1914) (Afr. Orient. Anglaise).

NAVÁS *loc. cit.* :

« Testaceus. Caput oculis fuscis; prosostomate ad apicem et palpis maxillaribus fuscis; antennis fuscis; vertice inter ocellos et ocellis fuscis. Thorax superne testaceo-ferrugineus. Abdomen apicem versus superne fuscescens; cercis ♂ elongatis, angustis, leviter deorsum arcuatis, a basi ad apicem leviter dilatatis, in tertio basilari inferne dente obtuso, apice truncatis; lamina subgenitali dilatata convexa, apice truncata. Alae membrana fulvo tincta, ad apicem obscurius, maxime juxta venas; stigmati subquadranguli, oblongo, parum fuscato, duplici venula postice cum ramo sectoris radii conjuncto; area postcubitali nulla venula ad apicem venae axillaris primae; reticulatione fusca. Ala anterior vena axillari prima paulo ante primam bifurcationem sectoris radii et thyridium ad marginem veniente, inter apicem axillaris secundae et postcubiti. Ala posterior vena axillari prima paulo post primam bifurcationem sectoris et thyridium ad marginem veniente, duplo distante ab apice axillaris secundae quam ab apice postcubiti.

Long. corp. : ♂ 22^{mm}; ♀ 20,5^{mm}; long. al. ant. : ♂ 25^{mm}, ♀ 24^{mm}; long. al. post. : ♂ 22^{mm}, ♀ 21,5^{mm}. »

Coll. SELYS : not present.

[**B. lineatus** Navás].

Bittacus lineatus (♀) NAVAS, Voyage de ALLUAUD et JEANNEL en Afr. Orient., *Planipennia* et *Mecoptera*, p. 48, fig. 24 (1914) (Afr. Orient. Anglaise).

NAVÁS, *loc. cit.* :

« Ferrugineus. Caput oculis palpisque fuscis, prosostomate leviter arcuato, tenui, acuto; antennis gracilibus, testaceis. Pedes testacei, apice femorum, tibiæ et articularum tarsorum fusco; calcaribus testaceis, anterioribus medium primi articuli tarsorum haud attingentibus, posterioribus longe superantibus; tarsis articulo primo ceteris simul sumptis aequilongo. Alae post medium ampliatae, apice parabolicae; membrana leviter fulvo tincta; stigmatæ, quadrangulæ, duabus venulis cum sectore radii conjuncto, ferrugineo; thyridio pallido, fusco annulato; reticulatione forti, fusca, venulis multis angustissime fusco limbatis, distinctius ad axillas sectoris radii et primæ ejus furcæ, ad ortum procubiti; vena axillari prima ante thyridium et primam bifurcationem sectoris radii ad marginem veniente, fere ad $\frac{3}{4}$ inter apicem venæ axillaris secundæ et postcubiti; duabus venulis cum postcubito connexa, externa ad apicem, interna in tertis basilari.

Long. corp. : 15,5^{mm}; long. al. ant. : 23,5^{mm}; long. al. post. : 21^{mm}. »

Coll. SELYS : not present.

I do not know *aequalis*, *discors* and *lineatus*, but it seems to me that *discors* may be a distinct species.

American species.

[**B. chlorostigma** Mac Lachl.] (fig. 161, 162).

Bittacus chlorostigma MAC LACHLAN, Ent. Monthl. Mag., p. 36, fig. (1881). — ID., Ent. Nachr., XIX, p. 317 (1893). — HINE, Journ. Col. Hort. Soc., XVIII, p. 110, pl. I, fig. 8; pl. II, fig. 3, 4 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 258, pl. LXI, fig. 37 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head dark reddish brown above; a black spot between the ocelli; front and rostrum blackish. Maxillary palpi reddish brown and blackish haired. Antennæ blackish; the two basal joints reddish brown. Thorax

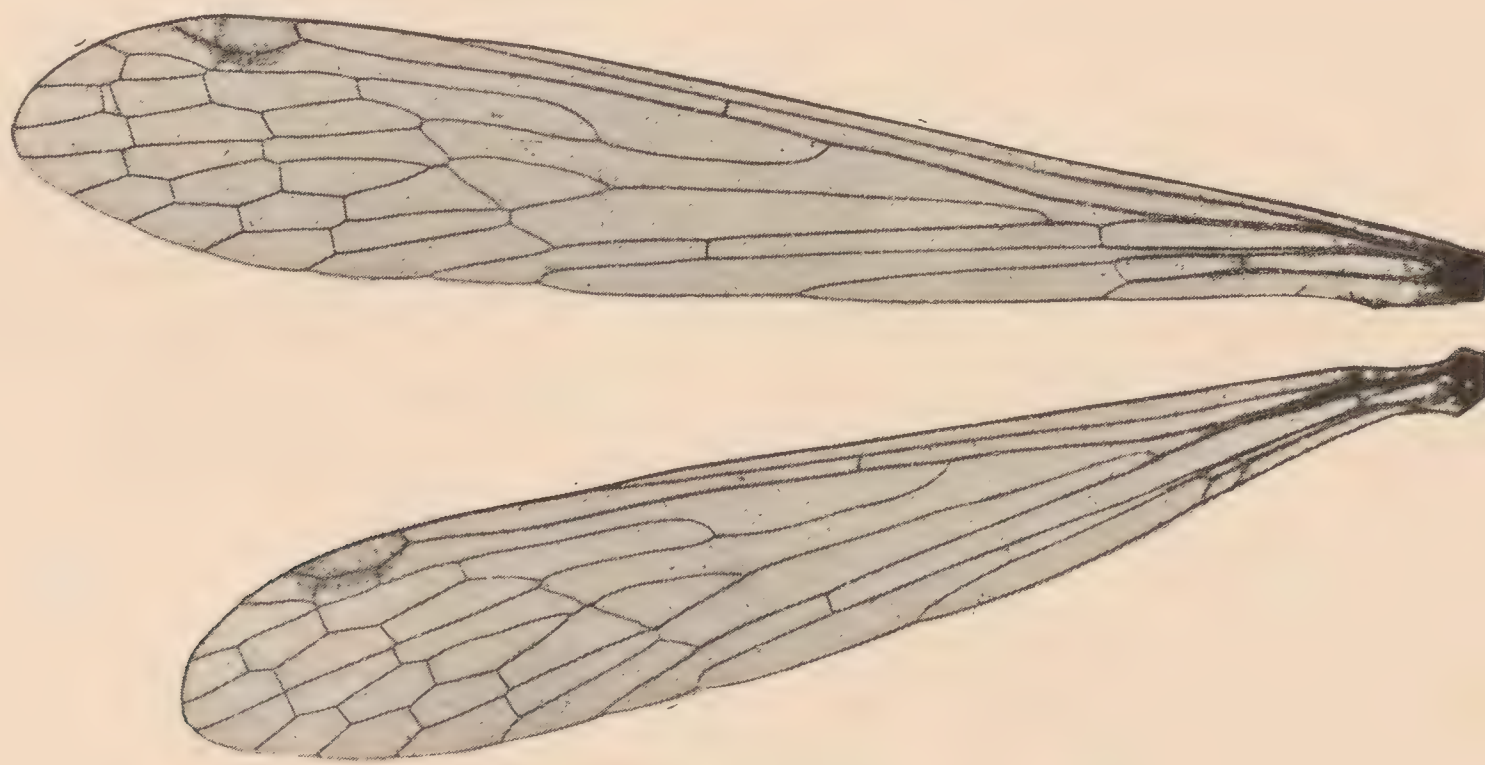


FIG. 161. — *Bittacus chlorostigma* ♂
(Coll. Banks).

pitchy brown, darker at the wing-roots. Abdomen pitchy brown, darker towards apex. Thorax and underside of abdomen basely with scattered spinose hairs. Front margin of prothorax with three inconspicuous ones on each side. Legs dark reddish brown. Apex of femora, tibiae and of tarsal joints with a blackish ring. Basal joint of hind tarsus the longest, nearly as long as 2nd and 3rd joint together, which are equal in length; 4th joint a little longer than 3rd, but much shorter than 1st. Hind femora thick and stout. Upper appendage

twice as long as the claspers, exteriorly with thickened edges and with a slight keel from base nearly to apex parallel with the upper margin. Interiorly the appendage is concave, the edges equally thickened; a broad triangular inner tooth above the most dilated portion of the lower edge. Penis and upper appendage reddish brown, the latter darker at apex. Cerci and claspers brownish testaceous. Wings long and very

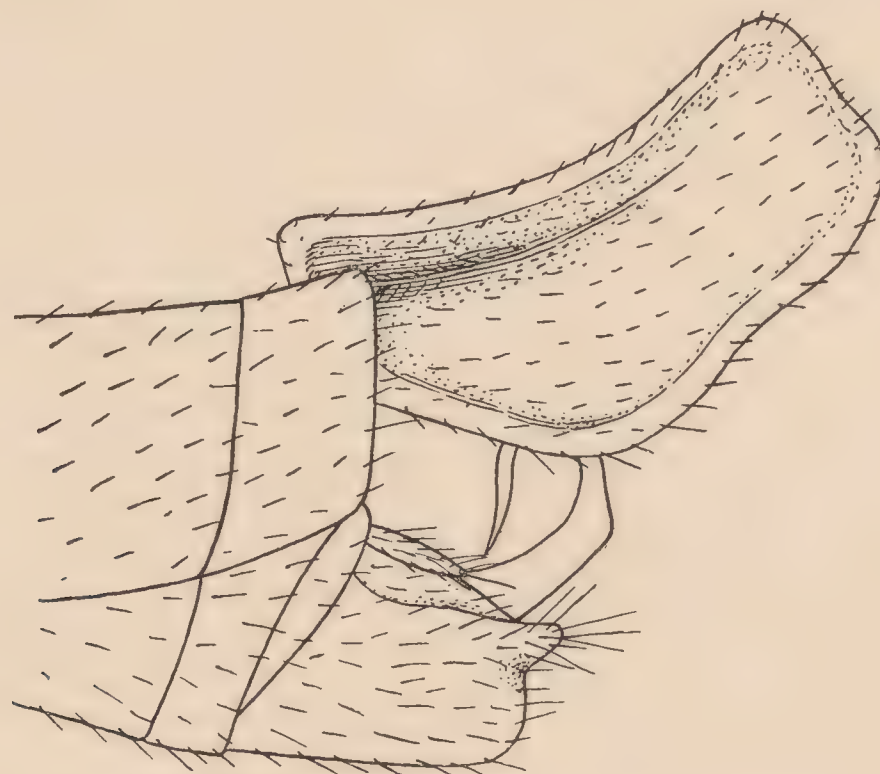


FIG. 162 — *Bittacus chlorostigma* ♂
Lateral view of anal appendages
(Coll. Banks).

narrow, scarcely dilated, hyaline. Pterostigma conspicuous, greenish-yellow. Venation black (except that part of R which touches the pterostigma). Costal area comparatively broad and very long, a basal cross vein present. 1A joins the hind much before fork of M. No Av. 2A half the length of 1A. The hind margin of the forewing almost straight.

Forewing : 27^{mm}; hindwing : 24^{mm}.

Coll. SELYS : not present. — Coll. BANKS : 1 ♂ California.

[**B. Banksi** Esben-Peters.] (fig. 126, 163).

Biittacus Banksi ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 238 (1915).

Head yellowish brown; rostrum yellowish brown with darker lateral margins; maxillary palpi blackish brown. A black spot between the ocelli. Antennae brown. Thorax and abdomen brown. Legs yellowish

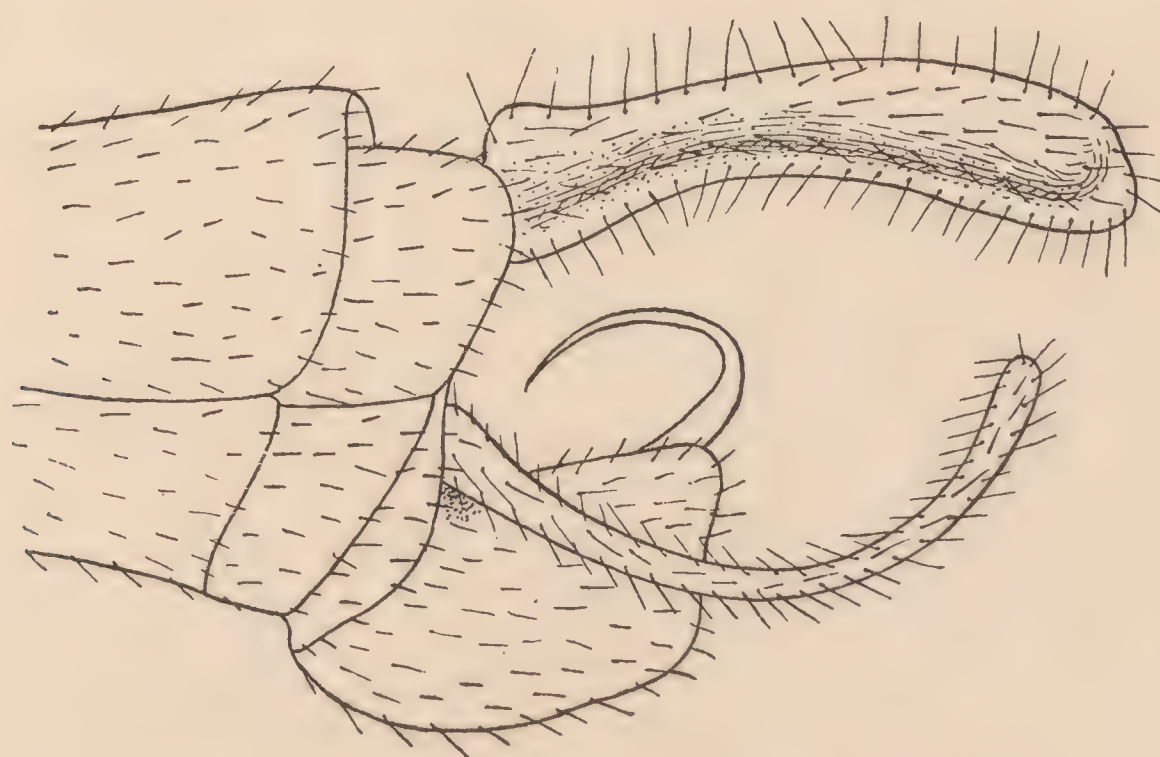


FIG. 163. — *Bittacus Banksi* ♂ type specimen
Lateral view of anal appendages
(Coll. Esben-Petersen).

brown; hind tarsi dark brown; tip of femora, tibiae and of tarsal joints blackish brown. Wings gradually broadened towards apex, which is rounded. Membrane yellowish brown; venation brown to dark brown.

Pterostigma twice longer than broad; two Pcv. Sc joins the costa beyond fork of Rs. No costal cross veins. Scv between origin and fork of Rs. Fork of Rs a little before fork of M. Cuv opposite to fork of M. Av before Cuv. 1A ends opposite to or a little before fork of Rs. Bristles on the margins of wings near base. In the male the branches of upper appendage very long; their ventral margins somewhat emarginate. Setae almost as long as upper appendage, slender, cylindrical, curved downwards in their middle.

Forewing : 23^{mm}; hindwing : 21^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 2 ♂, 3 ♀ Guerrero, Mexico (SMITH leg.); 3 ♂ S. Geronimo, Guatemala (CHAMPION leg.); 1 spec. San Blas, Jalisco (SCHUMANN leg.); 1 ♀ Temax, N. Yucatan (GAUMER leg.). — Mus. Hamburg : 1 ♂, 1 ♀, 1 spec. (abdomen lost) La Union, Salvador (R. PAESSLER leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Guadalajara, Mexico (ex coll. BANKS) (type).

In the shape of wings this species has some likeness to *B. mexicanus* KLUG, but there are several good and distinct characters. In *B. Banksi* the pterostigma is shorter, 1A joins the margin opposite to fork of Rs, and Av is present. In *B. mexicanus* 1A joins the margin far before fork of Rs; no Av. In the male of *B. mexicanus* the branches of upper appendage are pointed towards apex, their apical part being bent downwards.

[***B. mexicanus*** Klug] (fig. 164).

Bittacus mexicanus KLUG, Abh. Königl. Akad. Wiss. Berl., p. 99 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 466 (1853). — HAGEN, Syn. Neur. N. A., p. 246 (1861).

KLUG, *loc. cit.* :

« Von Mexico; aus den Sendungen der Herren GERHOLD und DEPPE.

Sehr ähnlich dem *B. italicus*, nur etwas grösser. Auch findet sich, wie beim *B. testaceus* vom Kap, in der Mitte des Kopfs ein schwärzlicher Fleck. Die Schenkel sind vor der Spitze mehr oder weniger deutlich schwärzlich. Dasselbe ist mehrentheils auch hinsichtlich der Schienen der Fall. Die Flügel sind schwach

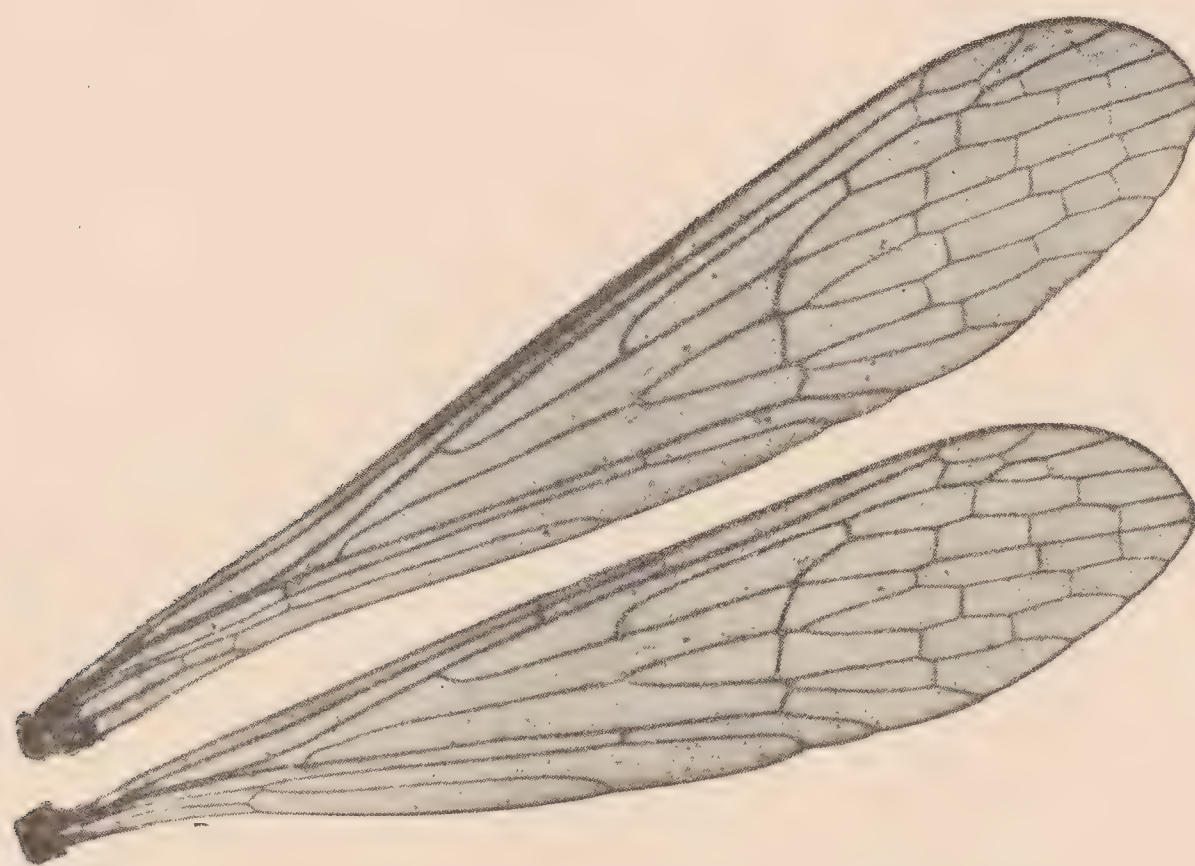


FIG. 164. — *Bittacus mexicanus* ♂ type-specimen (Museum Berlin).

gelblich, fast wasserhell, die Nerven, besonders die Queernerven, stärker und dunkler. Die Schaamzangen der Männchen sind länger, dünner und zugleich mehr gekrümmt, als bei den übrigen bekannten Arten. »

Coll. SELYS : not present.

I have only seen the type-specimens (2 ♂) when visiting the Mus. Berlin. No apical cross veins in the costal area. One cross vein in subcostal area before fork of Rs. Fork of Rs opposite to fork of M. Cuv a little before fork of M. Pterostigma thrice longer than broad; two Pcv. Bristles on the margins of wings near base. In the male the branches of upper appendage, seen from side, are broad at base becoming narrow and slender in the apical part, which is curved downwards; seen from above they are also rather broad at base and narrowed towards apex. Setae long and slender, but not so long as the upper appendage.

[*B. texanus* Banks].

Bittacus texanus BANKS, Trans. Am. Ent. Soc., XXXIV, p. 261 (1908) (Texas).

BANKS, *loc. cit.* :

« Rather reddish-yellow, ocelli on black, hind tarsus brown; wings more rufous-brown than in other species; in color similar to *B. mexicanus* (= *B. Banksi*), the costal apex of the wings being darkened as in that species; legs immaculate. Antennae minutely pubescent; hind femora swollen on basal part as much as in *B. occidentis*, but the joint is much longer. Male genitalia on the plan of *B. stigmaterus*, but the superior appendages are twice as long as the tenth ventral segment, the tip rounded, hairy, the upper edge barely concave, humped at base, the slender lower appendages (harpes) are longer than the tenth ventral segment, and a little more than one-half as long as the upper appendages. »

Coll. SELYS : not present.

I have not seen specimens of this species (type in coll. BANKS). Below I add some supplementary notes kindly forwarded to me by N. BANKS. No costal cross vein; Scv half way between origin and fork of Rs, the latter a little before fork of M. Cuv a little before the fork of M. No Av. In the forewing 1A joins the hind margin a little before Cuv, in the hindwing a little beyond Cuv. Pterostigma twice as long as broad; two Pcv. The anal appendages on the same plan as in *B. Banksi*, but the branches of upper appendage are not so long, the setae are not so slender and hardly reach two thirds the way to the tip of upper branches.

[*B. occidentis* Walker] (fig. 165).

Bittacus occidentis WALKER, Cat. Neur. Ins. Brit. Mus., p. 469 (1853). — HAGEN, Syn. Neur. Ins. N. A., p. 247 (1861). — HINE, Journ. Col. Hort. Soc., XVIII, p. 112, pl. II, fig. 11, 12 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 259, pl. LXI, fig. 35, (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

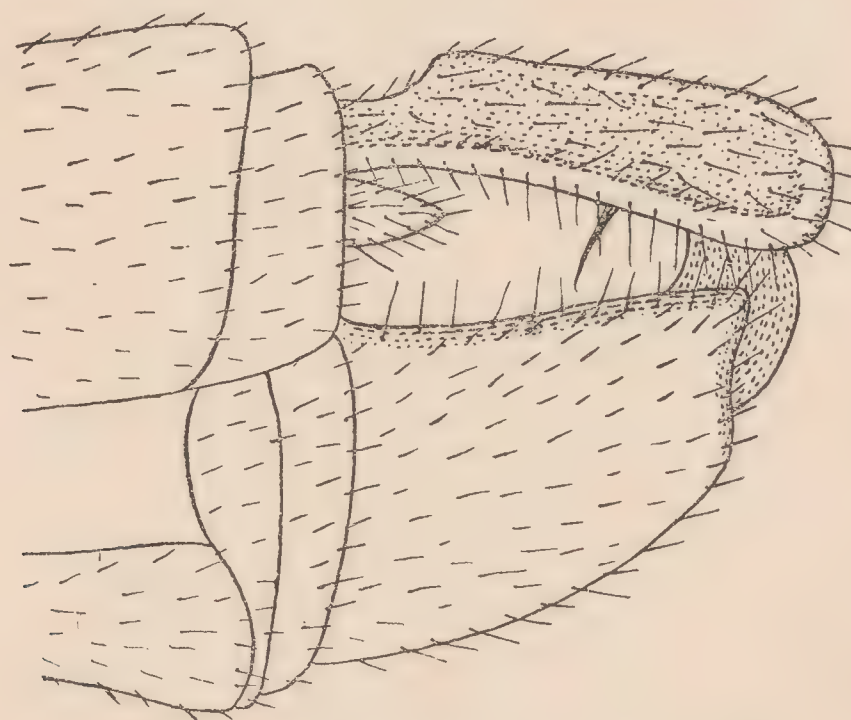


FIG. 165. — *Bittacus occidentis* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

Head and thorax brown; a darker spot between the ocelli. Antennae brown; the two basal joints a little paler. Thorax and abdomen brown; prothorax paler. Legs brown; tip of tibiae and of tarsal joints darker. Hind femora rather stout. Wings slender, gradually broadened towards apex, which is somewhat acute; the front margin of apical part of wing much more rounded than the hind margin, which is nearly straight. Membrane brownish yellow; venation a little darker; the apical margin of forewing faintly brownish shaded. No costal cross vein; Scv beyond fork of Rs, which is before Fm; Cuv nearly opposite to Fm; no Av; 1A joins the hind margin before Frs. Pterostigma subrectangular, $2\frac{1}{2}$ times longer than broad; two Pcv. Bristles on the hind margins of wings near base. In the male the tip of the branches of upper appendage with short, black bristles.

Forewing : 21^{mm}; hindwing : 18^{mm}.

Coll. SELYS : not present. — Mus. Stockholm : 3 ♂, 3 ♀ Texas (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂ East Falls Church (ex coll. BANKS).

The species has some likeness to *B. stigmaterus* but its wings are darker, more slender and with more acute tips; pterostigma longer. The anal appendages of males are quite different; in *B. stigmaterus* the setae are very long and slender; in *occidentis* short and conical.

[**B. punctiger** Westw.] (fig. 166).

Bittacus punctiger WESTWOOD, Trans. Ent. Soc. London, IV, p. 195 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 468 (1853). — HAGEN, Syn. Neur. N. A., p. 247 (1861). — ID., Stett. Ent. Zeit., XXIV, p. 377 (1863). — HINE, Journ. Coll. Hort. Soc., XVIII, p. 113, pl. II, fig. 9, 10 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 258, pl. IX, fig. 19 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

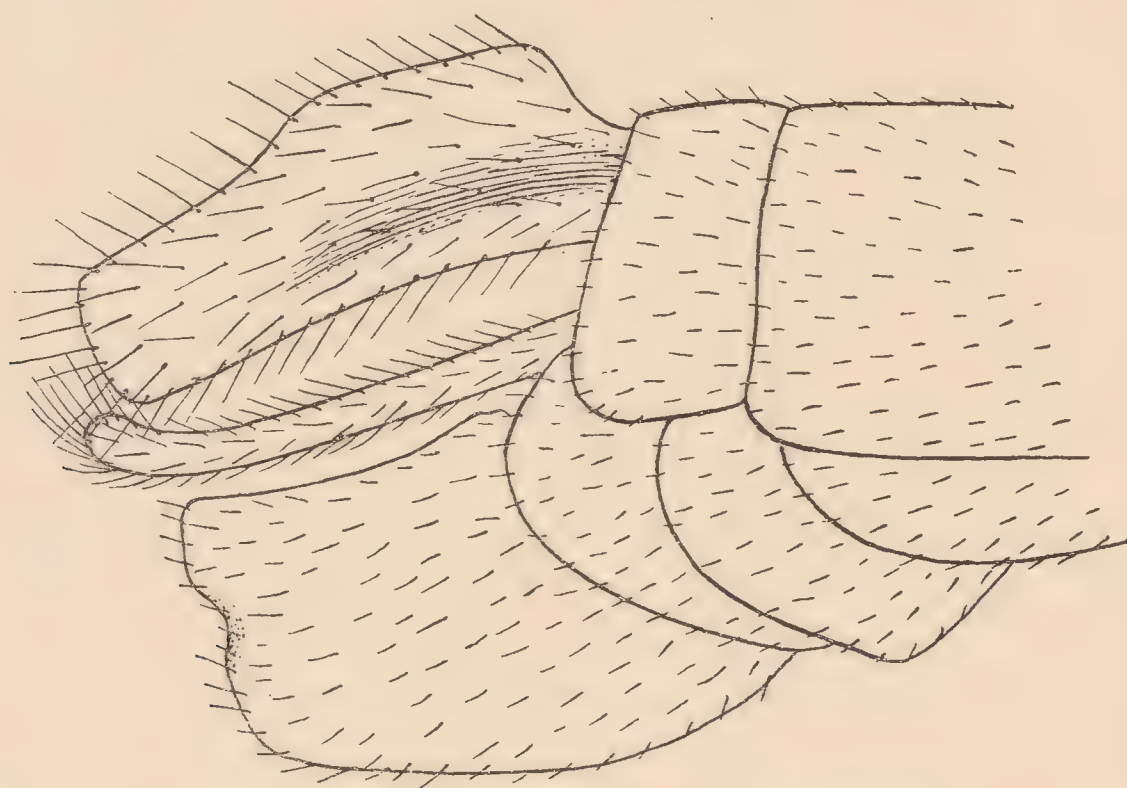


FIG. 166. — *Bittacus punctiger* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

Head and rostrum yellowish brown. A blackish spot between the ocelli. Antennae blackish brown, paler at the base. Thorax and abdomen brown; the abdominal segments with narrow blackish hind margin. Legs yellowish brown; tip of femora, tibiae and of tarsal joints blackish brown. Hind femora rather stout and with a few small black spots. Wings strongly broadened towards apex, which is broadly rounded. Membrane with a yellowish tinge; yellowish brown venation; the cross veins are broadly margined with brown; the basal parts of the wings with a few brownish spots. Pterostigma distinct, only a little longer than broad, yellowish brown; two Pcv. No costal cross vein. Scv between origin and fork of Rs, the latter a little before Fm. Cuv opposite to Fm. Av as a rule present. 1A joins the margin before Fm. Bristles on the margins of the wings near base.

Forewing : 18^{mm}; hindwing : 16^{mm}.

Coll. SELYS : 1 ♀ Georgia (MORRISON leg.). — Mus. Stockholm : 1 ♂, 1 ♀, Texas (BELFRAGE leg.); 1 ♂, 2 ♀ Illinois (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂, 3 ♀ Glen-carlyn, Virg. (ex coll. BANKS).

[**B. arizonicus** Banks].

Bittacus arizonicus BANKS, Trans. Am. Ent. Soc., p. 350, pl. XI, fig. 11, 12 (1911) (Arizona).

BANKS, *loc. cit.* :

« Closely related to *B. occidentis*, of same color, thickened femora, etc. But the male genitalia are more scabrous at tip, the superior pieces are more pointed, and narrower at tip and the inferior median piece has an apical tooth that can be seen in side view. The size is the same. »

Coll. SELYS : not present.

I have not seen specimens of this species (type in coll. BANKS); below I add some supplementary notes, kindly forwarded to me by N. BANKS :

No costal cross vein. In forewing Scv is beyond Frs, but before Fm, which is far beyond Frs. In hindwing Scv is just before Frs, which is opposite to Fm. No Av. In forewing 1A ends before Frs, in hindwing before Cuv. Pterostigma twice as long as broad, two Pcv.

[**B. stigmaterus** Say] (fig. 167).

Bittacus stigmaterus SAY, West. Quart. Rept., p. 164 (1823). — HAGEN, Syn. Neur. N. A., p. 247 (1861). — ID., Stett. Ent. Zeit., XXIV, p. 377 (1863). — HINE, Journ. Col. Hort. Soc., XVIII, p. 114, pl. I, fig. 7; pl. II, fig. 7,8 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 260, pl. LX, fig. 20 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Bittacus pallidipennis WESTWOOD, Trans. Ent. Soc. London, IV, p. 195 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 468 (1853).

Bittacus mexicanus HINE, Journ. Col. Hort. Soc., XVIII, p. 111, pl. II, fig. 17, 18 (1898). (nec KLUG).

Head yellowish brown; rostrum dark brown; maxillary palpi blackish; between the ocelli a blackish spot. Antennae yellowish. Thorax and abdomen brown. Legs yellowish brown; tip of tibiae and of tarsal joints brown; hind femora slender. Wings broadened towards apex except their basal fourth, which is narrow;

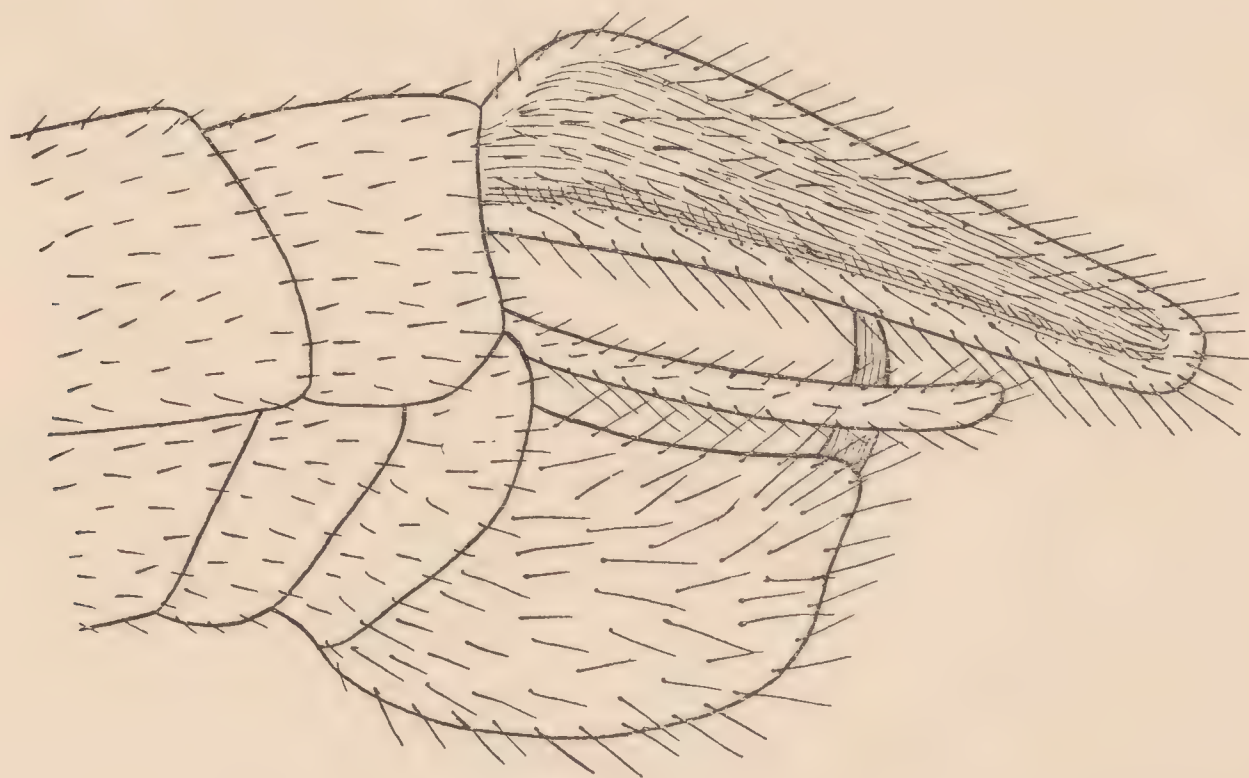


FIG. 167. — *Bittacus stigmaterus* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

apex rounded. Membrane with faint yellowish tinge; venation only a little darker. Pterostigma very distinct, yellowish brown, only a little longer than broad; two Pcv. Sc joins the costa nearly opposite to Frs. No costal cross vein. Scv before Frs. Frs and Fm forking almost at same distance from base. Cuv opposite to Frs and Fm. No Av. 1A joins the hind margin before Frs and Fm, but beyond origin of Rs. Bristles on the margin of wings near base. In the male the branches of upper appendage have a triangular production one third from base on their inner side of dorsal margin.

Forewing : 16-20^{mm}; hindwing : 15-18^{mm}.

Coll. SELYS : not present. — Mus. Hamburg : 1 ♂, 1 ♀, 1 spec. (abdomen lost) Dallas, Texas (J. BALL leg.). — Mus. Stockholm : 2 ♂, 2 ♀ Wisconsin (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 2 ♂, 2 ♀ Glencarlyn, Virg. (ex coll. BANKS).

B. strigosus Hag. (fig. 168, 169).

Bittacus strigosus HAGEN, Syn. Neur. N. A., p. 246 (1861). — HINE, Journ. Col. Hort. Soc., XVIII, p. 115, pl. I, fig. 1-6, 9-11; pl. II, fig. 5, 6 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 262, pl. LIX, fig. 9 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head and rostrum yellowish brown; a blackish spot between the ocelli, which are yellowish with short pile. Thorax brown; abdomen greyish brown; in the male the anal appen-



FIG. 168. — *Bittacus strigosus* ♂
(Coll. Esben-Petersen).

dages are yellowish. Legs yellowish, tip of femora, tibiae and of tarsal joints brown. Hind femora slender, Wings rather short and very broad; the tip rounded. Membrane pale, hardly

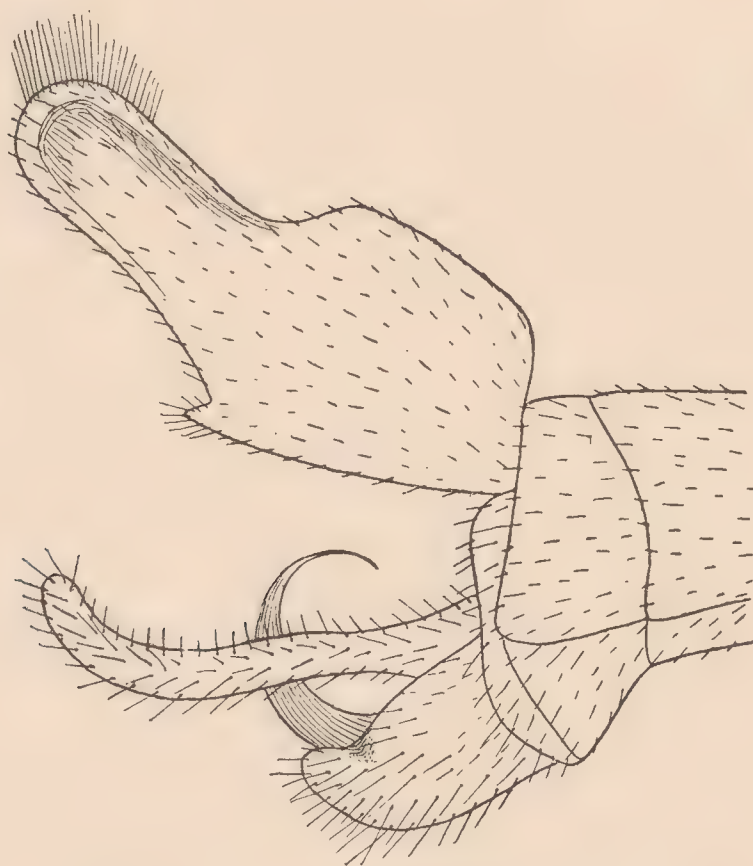


FIG. 169. — *Bittacus strigosus* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

with any yellowish tinge. Venation brown; the cross veins brownish margined. At the origin of Rs a brown spot. Pterostigma yellowish, $1\frac{1}{2}$ times as long as broad; two Pcv. No costal cross veins. Scv about half way between origin and fork of Rs, the latter opposite to that of M, Cuv a little before Fm. No Av. 1A joins the hind margin before Cuv. No bristles on the margins of the wings near base. In the male the dorsal margins of the branches of upper appendage are running parallel in their basal half; in their apical half they are curved outwards and strongly pilose.

Forewing : 19^{mm}; hindwing : 18^{mm}.

Coll. SELYS : 1 ♂ Chicago (OSTEN-SACKEN leg.); 1 ♂, 1 ♀ Illinois. — Mus. Stockholm : 1 ♂, 6 ♀ Illinois (BELFRAGE leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Glencarlyn, Virg. (ex coll. BANKS).

The species is closely related to *B. pilicornis*, from which it may easily be separated by its paler wings with broadly rounded apex, the shorter pile on the antennae and the different shape of anal appendages in the males.

B. pilicornis Westw. (fig. 170).

Bittacus pilicornis WESTWOOD, Trans. Ent. Soc. London, p. 196 (1846). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 468 (1853). — HAGEN, Syn. Neur. N. A., p. 246 (1861). — HINE, Journ. Col. Hort. Soc., XVIII, p. 113, pl. II, fig. 15, 16 (1898). — ID., Bull. Sc. Lab. Den. Univ., p. 261, pl. LX, fig. 17 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Head and thorax yellowish brown; a dark brown spot between the ocelli. Antennae brown with long pile. Thorax and abdomen brown. Legs yellowish brown; tip of femora, tibiae and of tarsal joints darker. Hind femora slender. Wings much broadened towards apex, which

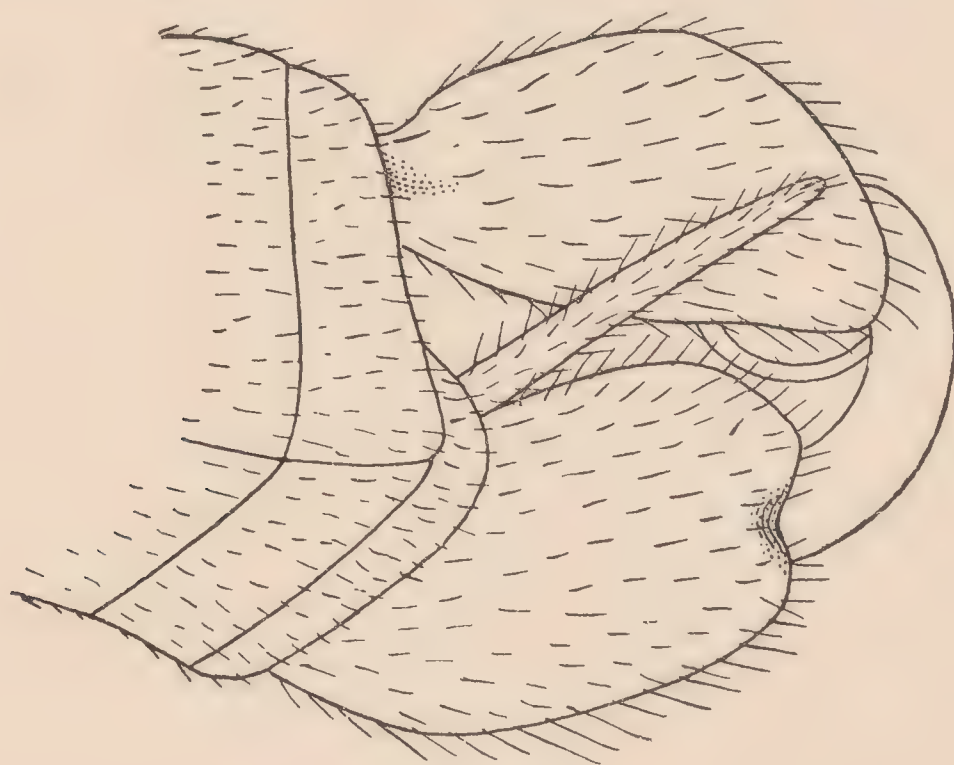


FIG. 170. — *Bittacus pilicornis* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

is rounded. Membrane with yellowish tinge, brown longitudinal veins and dark brown cross veins, which mostly are brownish shaded. No costal cross vein; Scv before Frs; Fm before Frs; Cuv a little before Fm. As a rule one cross vein at the end of 1A, which is short and joins the hind margin much before Fm. The origin of Rs and M strongly dark brown. Pterostigma subrectangular, about thrice as long as broad; two Pcv. The oblique row of cross veins distinctly dark brown. No bristles on the margins of the wings near base.

Forewing : 18-21^{mm}; hindwing : 16-18^{mm}.

Coll. SELYS : 1 ♂, 6 ♀ Georgia (MORRISON leg.); 1 ♀ Trenton Falls (OSTEN-SACKEN leg.). — Coll. ESBEN-PETERSEN : 2 ♂, 1 ♀ Great Falls, Virg. (ex coll. BANKS).

B. apicalis Hag. (fig. 171).

Bittacus apicalis HAGEN, Syn. Neur. N. A., p. 248 (1861). — HINE, Journ. Col. Hort. Soc., XVIII, pl. II, fig. 13, 14, (1898). — ID., Bull. Sc. Lab. Den. Univ., XVIII, p. 255, pl. LX, fig. 15 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

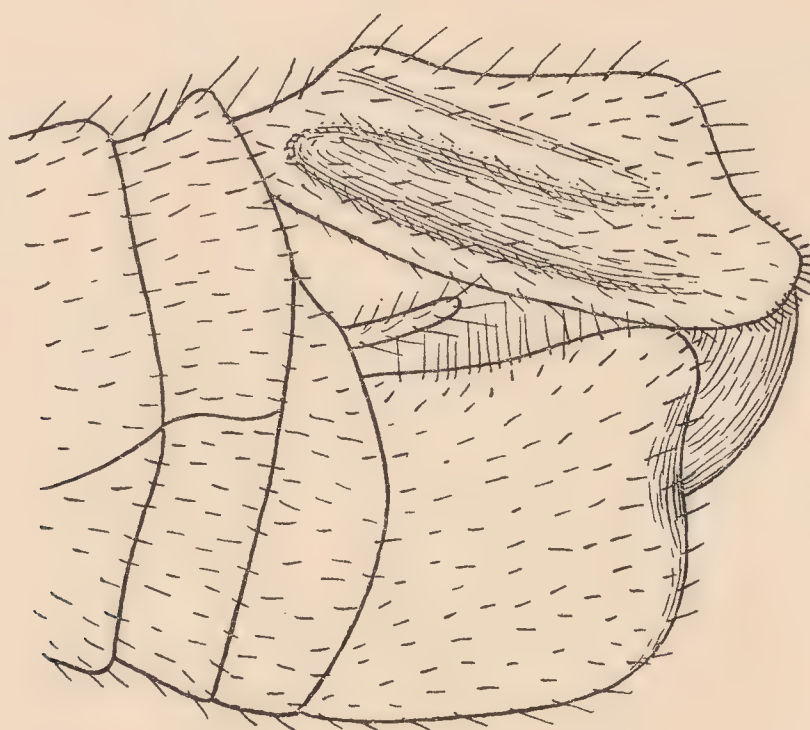


FIG. 171. — *Bittacus apicalis* ♂
Lateral view of anal appendages
(Coll. Esben-Petersen).

Head and rostrum yellowish; thorax and abdomen greyish brown to pitchy black. Ocelli blackish. Antennae yellowish. Legs yellowish brown; tip of tibiae and of tarsal joints blackish. Hind femora rather stout. Wings rather slender, tip somewhat pointed. Membrane with a faint yellowish tinge, venation brown, apex with a narrow sooty brown band. Pterostigma yellowish brown, subtriangular; one Pcv. Sc joins the costa a little before Frs. No costal cross vein; Scv before Frs, which is opposite to Fm. No Av. 1A joins the margin far before Fm. Bristles on the margin of wings near base. Tip of branches of upper appendage black and with short black bristles on its inner side.

Forewing : 15-16^{mm}; hindwing : 13-14^{mm}.

Coll. SELYS : 1 ♀ N. Carolina (MORRISON leg.). — Coll. ESBEN-PETERSEN : 1 ♂ Bloomington, Ill., 15.VII.1893 (ex coll. BANKS).

[B. geniculatus Erichs.] (fig. 172).

Bittacus geniculatus ERICHSON, Schomburgk, Britisch Guyana, III, p. 586 (1848).

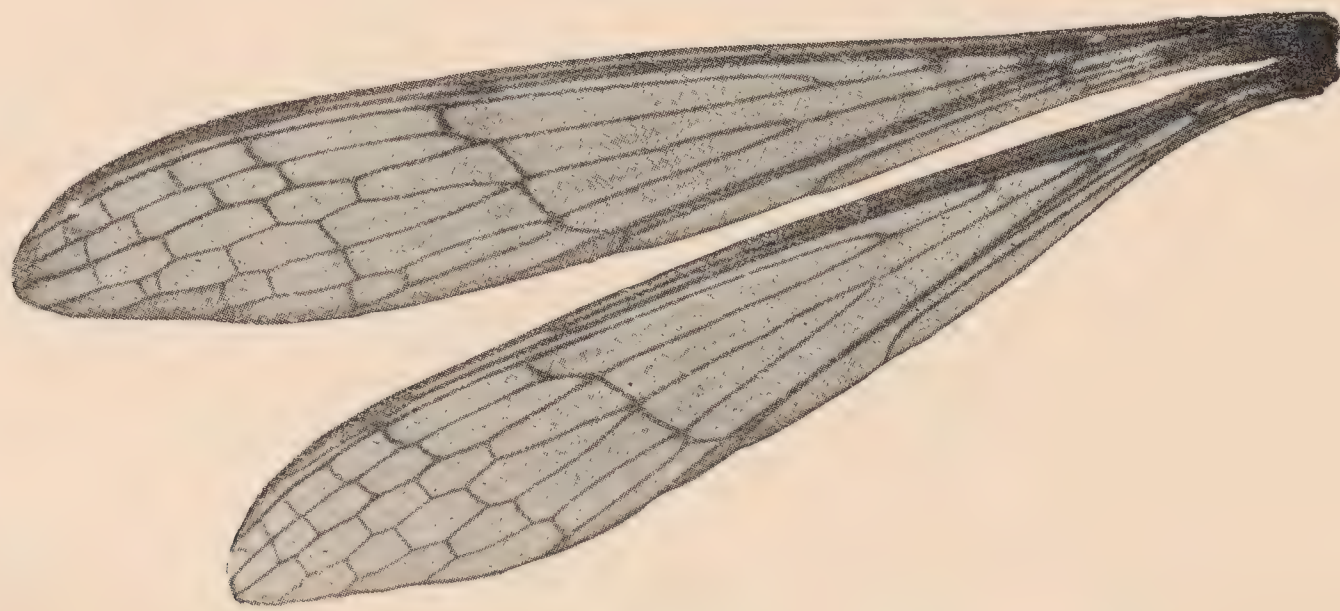


FIG. 172. — *Bittacus geniculatus* ♂ type-specimen
(Museum Berlin).

ERICHSON, *loc. cit.* :

« Von der Grösse *B. brasiliensis* KL., hell gelbbraun. Die letzten Hinterleibsringe etwas dunkler, die Spitze der Schenkel und Schienen dunkel braun. Die Flügel sind schmal, ohne Randmal, alle Queradern

braun getrübt. Am nächsten steht diese Art den *B. flavescens* KL., welcher aber ein braunlichgelber Randmal hat ».

Coll. SELYS : not present.

I have seen the type, ♂, in Mus. Berlin. Two apical cross veins in the costal area, one in the subcostal area near tip of Sc. Frs before Fm. Cuv near the end of Cu². No Av. 1A joins the hind margin a little beyond Fm. Pterostigma very long and narrow. No bristles on the margins of the wings near base. Branches of upper appendage, seen from side, straight, held in same direction as the abdomen, with parallel margins and rounded tips; seen from above they are narrowed towards the tips, which are curved a little outwards.

[*B. flavescens* Klug] (fig. 173, 174).

Bittacus flavescens KLUG, Abh. Königl. Akad. Wiss. Berl., p. 99 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 166 (1853).

Bittacus affinis WESTWOOD, Trans. Ent. Soc. London, IV, p. 196 (1846). — WALKER, *loc. cit.*, p. 468 (1853).

Head, rostrum and maxillary palpi yellowish brown. Between the very large ocelli a blackish spot. Antennae pale brown. Thorax and abdomen yellowish brown; terminal segments of abdomen dark brown.

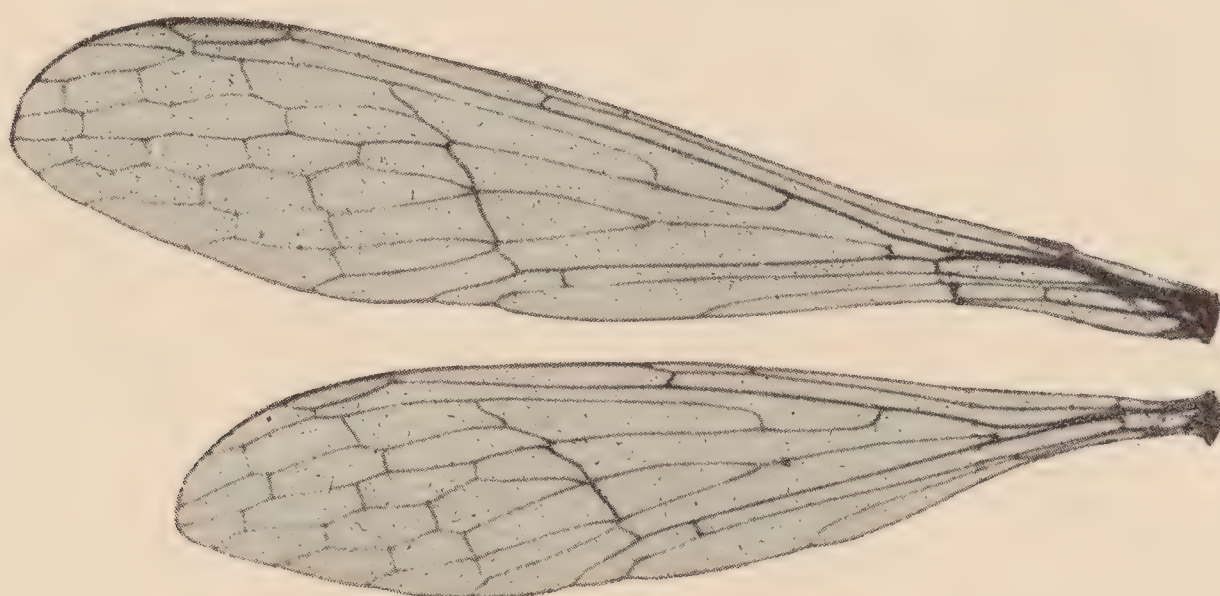


FIG. 173. — *Bittacus flavescens* ♂ type-specimen (Museum Berlin).

Legs yellowish brown; hind tarsi brown. Wings with rounded apex, hyaline with a faint yellowish tinge; venation yellowish brown; in adult specimens the cross veins slightly shaded with yellowish brown. One

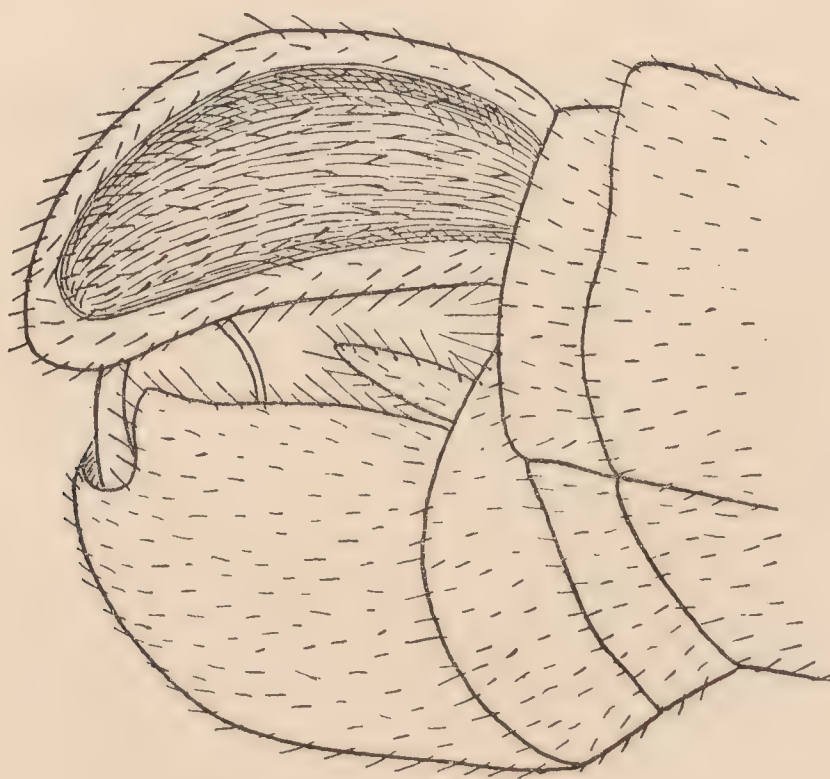


FIG. 174. — *Bittacus flavescens* ♂ Lateral view of anal appendages (Museum Vienna).

apical cross vein in the costal area, and one in the subcostal area near the tip of Sc; both cross veins beyond Frs, which is opposite to Fm. Cuv beyond Fm. No Av. 1A joins the margin nearly opposite to Fm. Ptero-

stigma four times as long as broad, strongly yellowish brown; one or two Pcv; the apical part of the pterostigma sometimes divided by a cross vein. Bristles on the posterior margins of the wings near base.

Forewing : 20-23^{mm}; hindwing : 18-20^{mm}.

Coll. SELYS : not present. — Mus. Copenhagen : 1 ♀ Lagoa Santa (REINHARD leg.). — Mus. Hamburg : 1 ♂ Santa Cruz, Rio Grande do Sul (STIEGLMAYR leg.); 1 spec. (abdomen lost) Puerto Cabello (W. SIEVERS leg.). — Mus. Vienna : 1 ♂ Pao d'Alto (PENTER leg.); 1 spec. (terminal segments lost) Esperito Santo, Brazil.

[**B. brasiliensis** Klug] (fig. 175).

Bittacus brasiliensis KLUG, Abh. Königl. Akad. Wiss. Berl., p. 98 (1836) (Brazil). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 466 (1853).

KLUG, *loc. cit.* :

« Von SELLOW in Brasilien in der Gegend von Cassapava gefangen.

Diese Art stimmt in Gestalt und Grösse mit dem *B. italicus* fast ganz überein, nur dass die Flügel im Verhältnis etwas länger sind. Die allgemeine Färbung ist etwas dunkler. Die Flügel sind schwach gelblich,

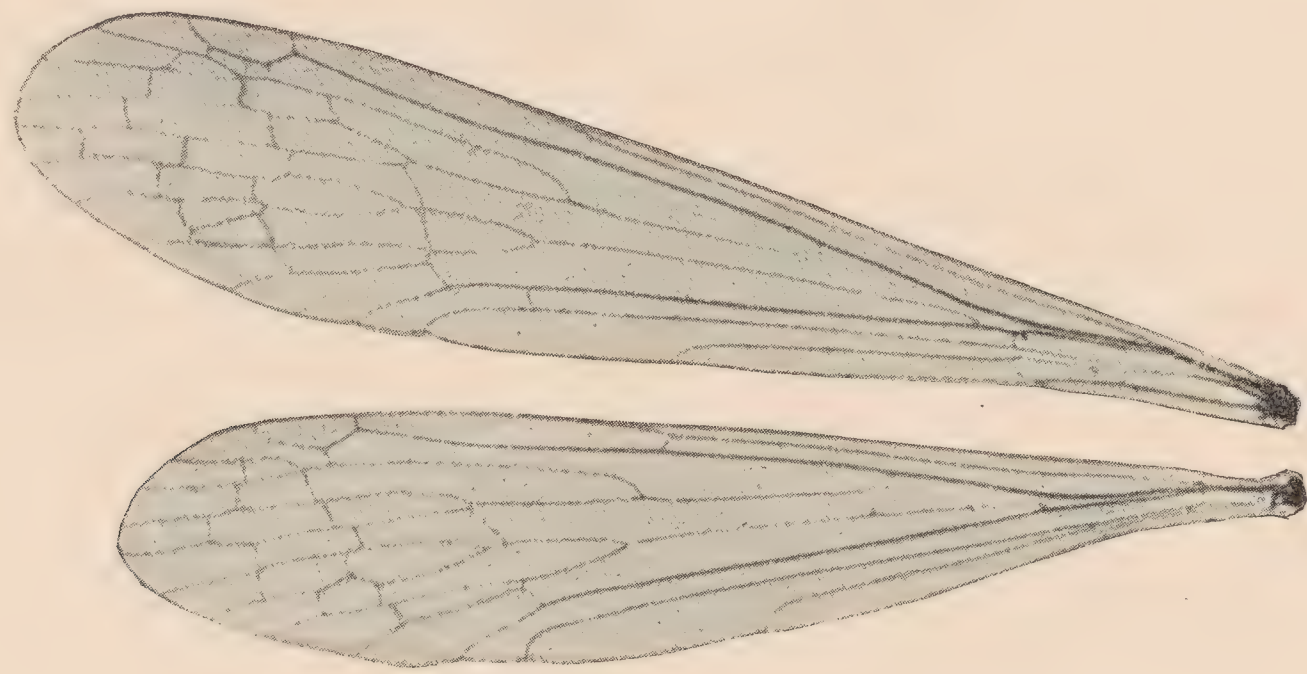


FIG. 175. — *Bittacus brasiliensis* ♀ type-specimen (Museum Berlin).

fast wasserhell durchscheinend mit blassbräunlichen Nerven und Randmahl. Die Mitte des Kopfs, die Fühler vom ersten Gelenk an, die Spitzen der Schienen und die Fussglieder sind etwas, doch kaum merklich, dunkler, als die übrige Körper ».

Col. SELYS : not present.

I have seen the three type-specimens (♀) in the Mus. Berlin. No apical cross vein in the costal area; the cross vein in the subcostal area near the tip of Sc and opposite to Frs. Fm opposite to Cuv, but beyond Frs. No Av. 1A joins the hind margin before Frs. No bristles on the margins of the wings near base.

[**B. femoralis** Klug] (fig. 176).

Bittacus femoralis KLUG, Abh. Königl. Akad. Wiss. Berl., p. 98 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 466 (1853).

KLUG, *loc. cit.* :

« Sehr ähnlich der vorhergehenden Art (*B. brasiliensis*), doch hinreichend dadurch unterschieden, dass ausser dem dunklen Fleck in der Mitte des Kopfs und den schwärzlichen Fühlern die Schenkel der vordern Beine, fast bis zur Wurzel hin, die der hintersten Beine an der Spitze, die Spitzen der Schienen und die Fussglieder eben so dunkel gefärbt sind. Die Flügel sind fast wasserhell mit bräunlichen Nerven. Das Randmal ist nicht deutlich gefärbt.

Coll. SELYS : not present.

I have seen the two type-specimens (Mus. Berlin), which have lost their terminal segments of the abdomen. One apical cross vein in the costal area; one cross vein in the subcostal area near the tip of Sc, far

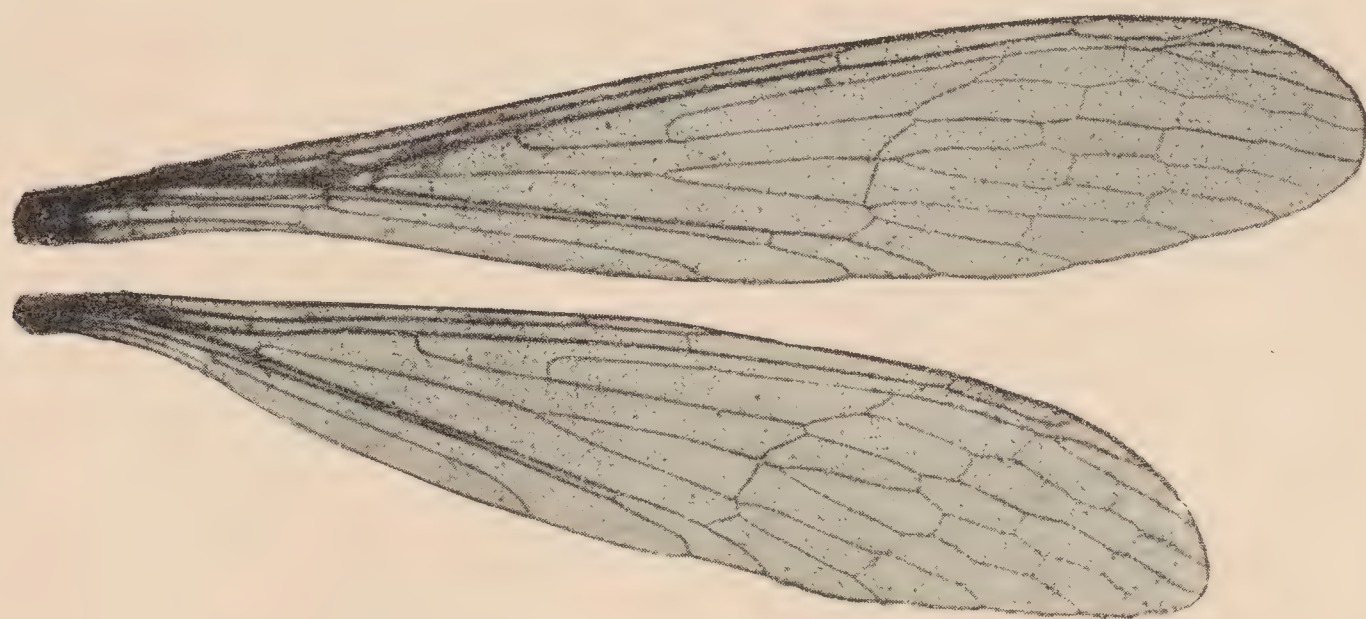


FIG. 176. — *Bittacus femoralis* type-specimen (Museum Berlin).

beyond Frs. One cubital cross vein far beyond Fm. No Av. 1A ends opposite to Fm and Frs. Pterostigma very long and narrow; two Pcv.

B. chilensis Klug (fig. 177, 178) (plate II, fig. 22).

Bittacus chilensis KLUG, Abh. Königl. Akad. Wiss. Berl., p. 100, pl., fig. 6 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 467 (1853). — MAC LACHLAN, Ent. Monthl. Mag., XXX, p. 39 (1894).

Thyridates chilensis NAVÁS, Mem. Real Akad. Cienc. Barcelona, p. 412 (1908).



FIG. 177. — *Bittacus chilensis*

Head, rostrum and maxillary palpi yellowish. On vertex a brownish black spot enclosing the ocelli. Antennae testaceous; the two basal joints stout. Thorax and abdomen testaceous

with brownish spots at the root of the wings. Legs greyish testaceous; tip of tibiae and of tarsal joints darker. Wings rather broad and with rounded tip. Membrane hyaline with a very faint tinge of yellowish brown, especially along the front margins; venation pale brown; the cross veins in the apical part broadly shaded with pale sooty brown. Sooty brown spots are also found

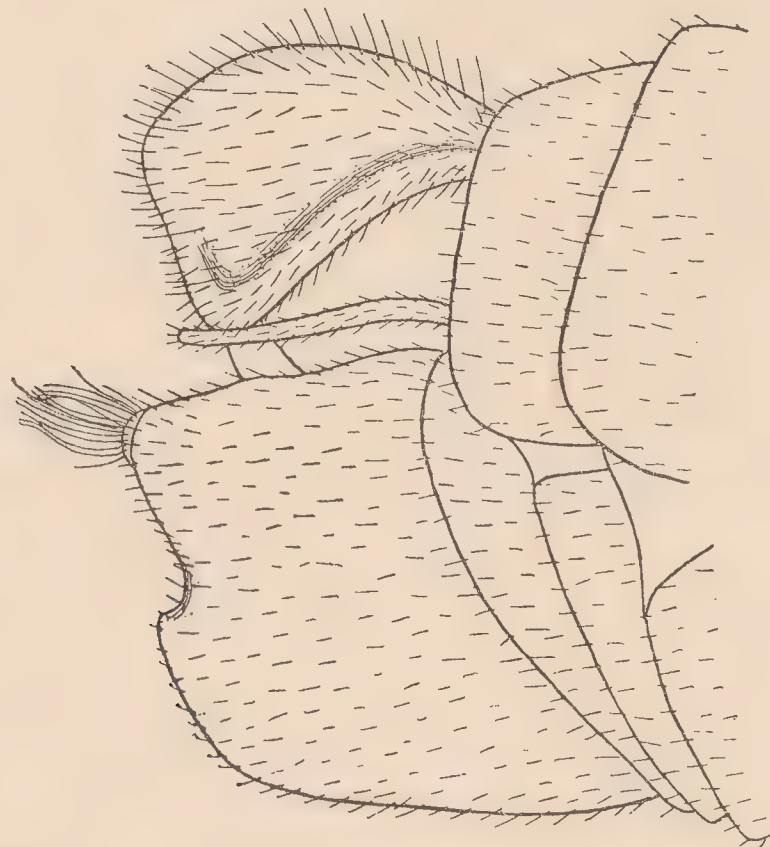


FIG. 178. — *Bittacus chilensis* ♂
Lateral view of anal appendages
(Coll. Selys).

at the origin of Rs, at Frs, at Fm (this spot encloses a small whitish one) and at the place where M separates from Cu'. Pterostigma indistinctly coloured, about thrice as long as broad; two or three Pcv. In the costal area one or two apical cross veins. Scv near tip of Sc. Frs a little before Fm. Cuv a little beyond Fm. No Av near tip of 1A, which joins the hind margin opposite to Fm. 2A short, only $\frac{1}{3}$ as long as 1A. 3A present. Bristles on the margins of the wings near base.

Forewing : 34^{mm}; hindwing : 31^{mm}.

Coll. SELYS : 1 ♂ Chile. — Coll. LACROIX : 1 ♂ Chile.

The genus *Thyridates*, erected by NAVÁS for this species, must be transferred to the list of synonyms. The main character, the presence of two cross veins near the tip of the costal area, varies very much. In the specimen before me are two cross veins in the left fore- and hindwing; in the right fore- and hindwing only one is present. The other generic characters mentioned by NAVÁS are found in a great number of species.

Genus **NEOBITTACUS** Esben-Petersen.

ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 130 (1914).

Eyes wide apart below the antennae. Wings long and slender with falcate apex, strongly decorated with bands and dots. Costal area with about 5 cross veins. In the subcostal area the apical cross vein is placed at the end of the Sc. 1A joins the hind margin far beyond Fm. Cubital area very narrow. Subgenital plate in the ♀ large, strongly haired. Basal joint of hind tarsus a little longer than 2nd and 3rd united; 3rd a little shorter than 2nd; 4th one and a half times shorter than 1st. 3A present in the forewing.

Habitat of the genus is South America.

Type : *N. Blancheti* PICR.

N. Blancheti (Pictet) (fig. 179).

Bittacus Blancheti PICTET, Mém. Soc. Phys. et d'Hist. nat. Genève, VII, p. 7, pl. 1, fig. 3 (1836). — KLUG, Abh. Königl. Akad. Wiss., p. 100 (1836). — RAMBUR, Hist. nat. Ins. Névropt., p. 327, pl. 8, fig. 6 (1842). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 467 (1853). — BRAUER, Verh. zool.-bot. Ges., X, pp. 691-696 (1860).
Neobittacus Blancheti ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 131 (1914).

Head, thorax and abdomen dark brown. The two basal joints of antennae stout, a little longer than broad; the following joints cylindrical, long, very slender and strongly pilose. Thorax dorsally with some ill-defined dark spots, laterally with some black ones. Abdomen a little paler towards the apex. Fore femora black with a broad reddish brown band a little before



FIG. 179. — *Neobittacus Blancheti* ♀
 (Museum Hamburg).

apex; intermediate and hind femora and all the tibiae reddish brown with a black band at the tip. Tarsi reddish brown. Wings dark brown with three hyaline cross bands, which do not reach the anterior margin, and of which the two basal ones are connected along the posterior margin. Along the margins of wings several hyaline spots of different size are present. A larger one is found just before the pterostigma, and sometimes several ill-defined are present in the middle of the apical part of the wing. Where M and Cu¹ separate is found a large blackish brown spot, and a smaller one is present in the posterior part of the hyaline median band, enclosing a cross vein between Cu¹ and Cu². At Fm is found a large hyaline spot, and two smaller ones enclose each one of the chitinous dots in the disc of wing. Frs opposite to Fm and far before Cuv. 1A joins the hind margin far beyond Fm. No Av. Pterostigma about 4 times as long as broad. Bristles on the hind margin of wings near the base.

Forewing : 31^{mm}; hindwing : 28^{mm}.

Coll. SELYS : 1 specimen (abd. lost). — Mus. Hamburg : 1 ♀ Espirito Santo. — Mus. Copenhagen : 1 specimen (apex of abd. lost), Brazil (LUND leg.).

In one of the specimens before me (Mus. Hamburg) there is a subcostal cross vein a little before the apical one, and in the same specimen is found an oblique cross vein between the hind branch of M and Cu¹, far before the ordinary one.

Genus **HARPOBITTACUS** Gerst.

Harpobittacus GERSTAECKER, Mittheil. naturw. Vereins f. Neuvoorp. u. Rügen, XVI, p. 119 (1885). — MAC LACHLAN, Ent. Nachr., XIX, p. 316 (1893). — HINE, Journ. Col. Hor., Soc., XIII, p. 4 (1898). — ENDERLEIN, Zool. Anz., XXXV, p. 398 (1910). — NAVÁS, Broteria Serie Zool., XI, p. 45 (1913).

Abdomen stout. The subgenital plate in the female very short. The hind femora strong and thick. 1st joint of hind tarsi of the same length as 4th, in the male a little longer. Wings long and narrow; hind border near to the base conspicuously curved inwards. As a rule 1A joins the hind margin opposite to Fm. 2A hardly half as long as 1A. Pterostigma very distinct and well marked.

The genus is restricted to Australia and Tasmania.

Type : *H. australis* KLUG.

H. australis Klug (fig. 180, 181).

Bittacus australis KLUG, Abh. Königl. Akad. Wiss., p. 100, fig. 7 (1836). — WALKER, Cat. Neur. Ins. Brit. Mus., p. 467 (1853). — SELYS, Ann. Soc. Ent. Belg., XI (Compt. Rend., pp. 77-78) (1867-1868). — FROGGATT, Proc. Linn. Soc. N. S. Wales, p. 359 (1902).

Harpobittacus australis GERSTAECKER, Mittheil. naturw. Verein f. Neuvoorp. u. Rügen, XVI, p. 119 (1885). — WEELE, Die Fauna Sydwest-Australiens, p. 255 (1907). — ENDERLEIN, Zool. Anz., XXXV, p. 398 (1910).

Bittacus corethrarius RAMBUR, Hist. nat. Ins. Névr., p. 327 (1842)

Bittacus intermedius (♀) SELYS, loc. cit.

Harpobittacus intermedius GERSTAECKER, loc. cit.

Head yellowish brown, vertex black; the two apical thirds of rostrum black. Labial and maxillary palpi black. Antennae black; the two basal joints stout; the 2nd shorter than the 1st and almost globular. Thorax reddish brown; the dorsum of prothorax and the front half part of the dorsum of mesothorax brownish black or black. Abdomen reddish brown. In the ♂ the hind border of 2nd-5th segments is narrowly blackish above; 6th and 7th quite black above; 8th and 9th reddish brown; in the ♀ the hind border of 2nd-4th segments is narrowly blackish above, 5th to 7th and front part of 8th totally black above, apical part of 8th and the whole 9th reddish brown above. Fore and intermediate legs black; femora with a broad reddish brown band at their base; hind legs reddish brown, the tip of femora and tibiae with a broad black band; the base of tibiae with a narrower one; tarsi and spines blackish.

Wings hyaline with smoky brown tinge, yellowish at the base. Venation blackish brown; yellowish brown towards the base with the exception of the radius, which is blackish brown nearly to the base, especially in the forewing. Pterostigma dark brown, 3 or 4 times as long as broad and with two Pcv. Where M separates from Cu¹ is sometimes found a small brown dot, touching the curved part of the stalk of M. No apical cross vein in the costal area. Scv in the forewing half the way between the origin of Rs and Frs; in the hindwing nearest to the origin of Rs. Frs before Fm. Cuv beyond Frs but before Fm. Av beyond the origin of Rs but before Frs. 1A joins the hind margin of the wing beyond the Frs or sometimes opposite to Fm. Bristles on the margins of the wings near to the base.

Upper appendage of ♂, seen from side, thrice as long as broad; the apical third curved upwards, narrowed at the tip. The apex with short black bristles on the interior side; the lower margin about in the middle with a stout tooth interiorly. The hind border of 9th segment above

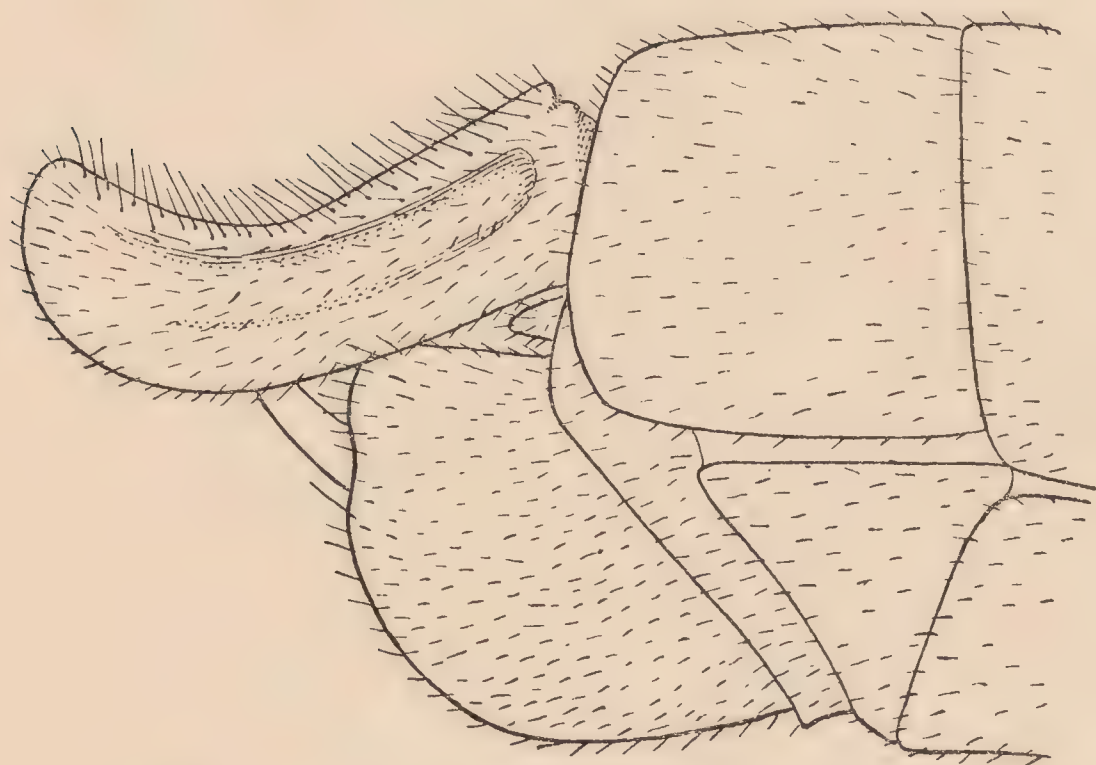


FIG. 180. — *Harpobittacus australis* ♂
Lateral view of anal appendages
(Coll. Selys).

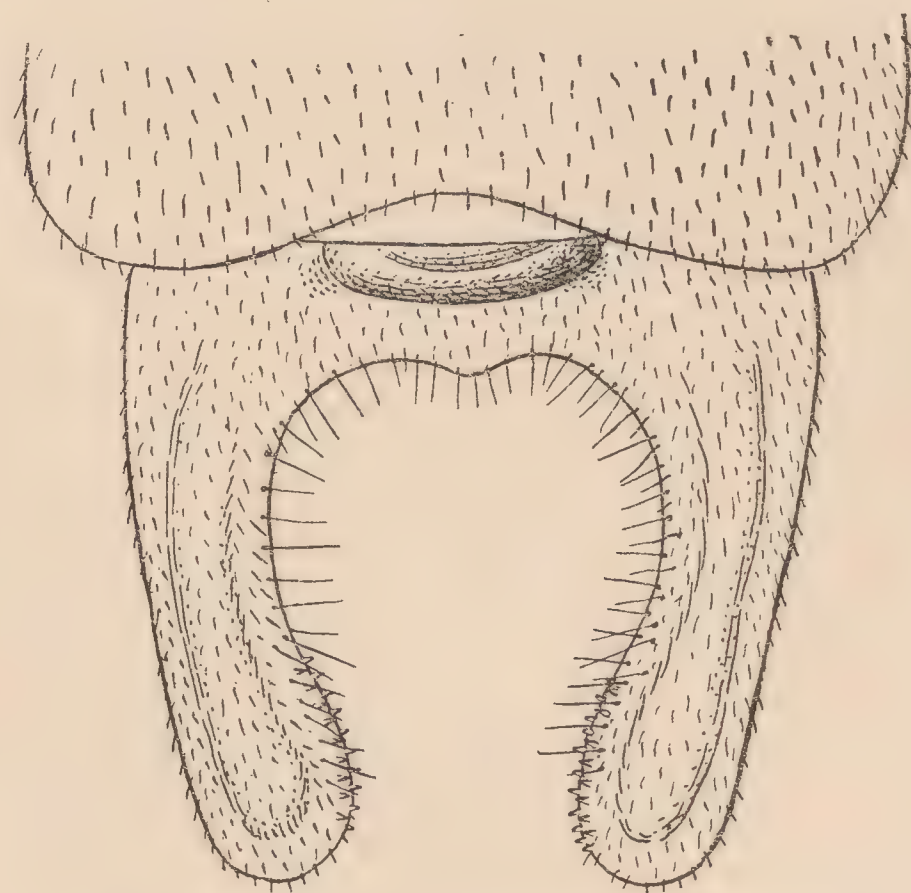


FIG. 181. — *Harpobittacus australis* ♂
Dorsal view of anal appendages
(Coll. Selys).

hardly produced. Claspers, seen from side, short and very broad; ventral margin strongly rounded, the tip incised; all the anal appendages yellowish brown.

Coll. SELYS : 3 ♂, 4 ♀ Australia; 2 ♀ Queensland; 1 ♂, 1 ♀ Tasmania; 2 specimens (without abdomen), Australia. — Mus. Copenhagen : 1 ♂, 1 ♀ Australia. — Coll. Froggatt : 1 ♀ N. S. Wales. — Mus. Hamburg : 1 ♀ Brunswick (Hamb. S.-W. Austr. Exped. 1905).

Amongst the materiel in the Selysian collection is present the type-specimen, ♂, of *Bittacus corethrarius* RAMBUR and 2 ♀, labelled *Bittacus intermedius* SELYS. As to the two specimens there is no difference between them and *australis*.

H. Tillyardi Esben-Peters. (fig. 182, 183).

Harpobittacus Tillyardi ESSEN-PETERSEN, Ent. Medd. Köbenhavn, p. 240 (1915).

Head yellowish brown, vertex black; the two apical thirds of rostrum black; labial and maxillary palpi black. Antennae black; the two basal joints stout. Thorax yellowish brown; the dorsum of prothorax and of the front half of mesothorax brownish black or black. Abdomen reddish brown. In the ♂ the hind border of 2nd-6th segments is narrowly blackish above; 7th quite black above; 8th and 9th yellowish brown above. In the ♀ the hind border of 2nd to 5th segments is narrowly blackish above; 6th, 7th and partly the 8th totally black above; 9th reddish brown. Femora pale reddish brown; the apical half of fore and intermediate and the tip of hind femora black; fore and intermediate tibiae brown, hind tibiae yellowish brown, the base of tibiae with a narrow and the tip with a broad black band; tarsi and spines black.

Wings hyaline with smoky brown tinge, yellowish at the base. Venation blackish brown; yellowish towards the base with the exception of the radius, which is blackish brown nearly to the base, especially in the forewing. Pterostigma dark brown; twice to thrice as long as broad and with two Pcv. Where M separates from Cu¹ is sometimes found a small brown dot, touching the curved part of the stalk of M. No apical cross vein in the costal area. Scv in the

forewing half the way between origin of Rs and Frs; in the hindwing near to or almost at the origin of Rs. Frs before Fm. Cuv opposite to Fm. Av beyond origin of Rs but before Frs. 1A joins the hind margin opposite to or a little before Frs. Bristles on the margins of wings near to the base.

Upper appendages of ♂, seen from side, twice as long as broad; the upper margin, somewhat emarginated and the tip rounded. The apex with strong black and short bristles and

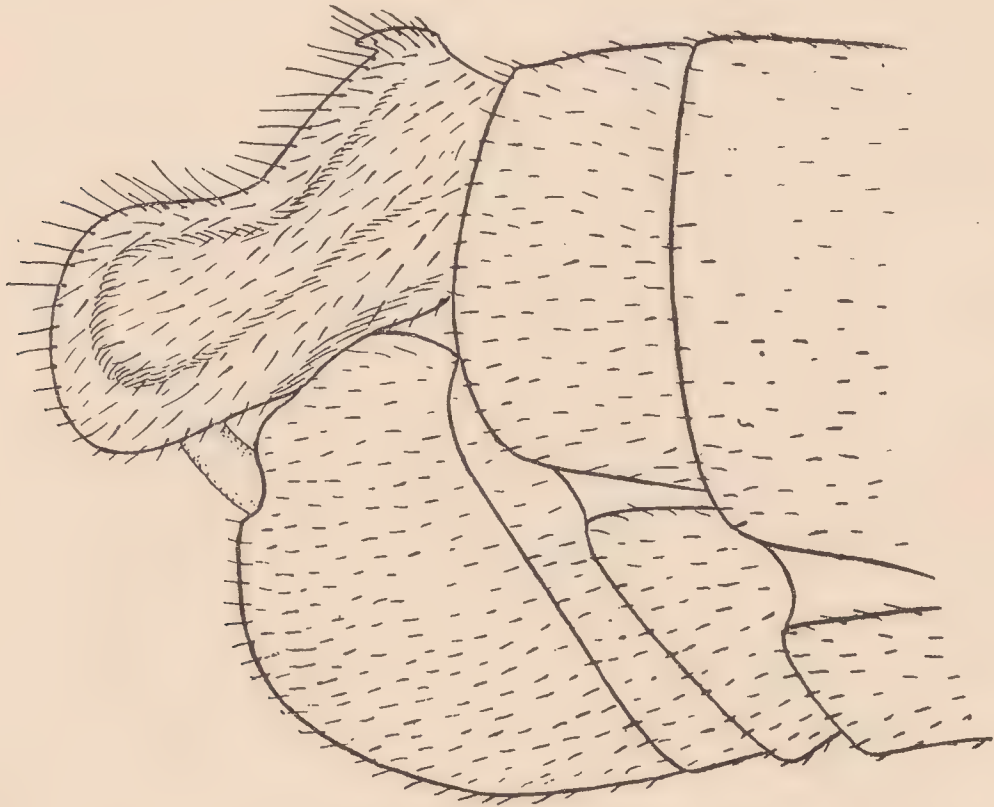


FIG. 182. — *Harpobittacus Tillyardi* ♂ type-specimen
Lateral view of anal appendages
(Coll. Selys).

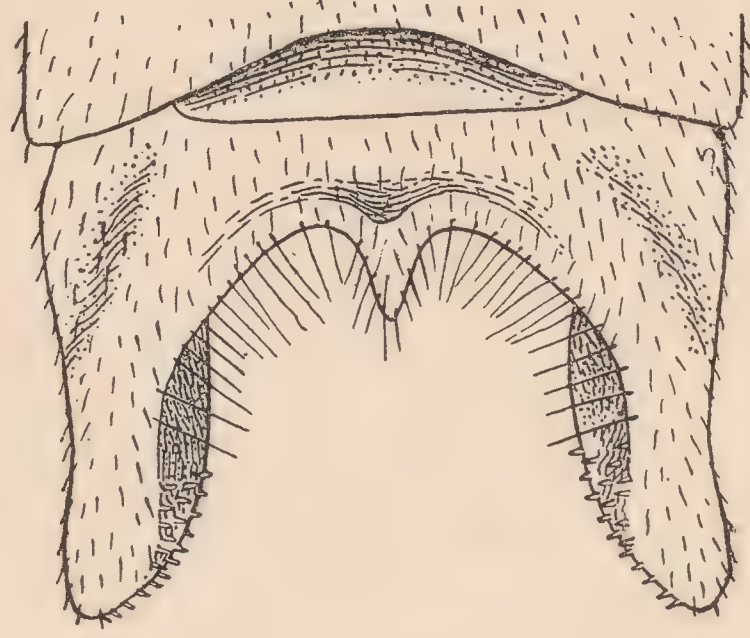


FIG. 183. — *Harpobittacus Tillyardi* ♂ type-specimen
Dorsal view of anal appendages
(Coll. Selys).

a tooth on the inner side. The hind border of 9th segment above produced into a triangular and somewhat raised prolongation. Claspers, seen from side, with rounded lower margin and deeply incised apical margin.

Forewing : 24-26^{mm}; hindwing : 21-23^{mm}.

Coll. SELYS : 1 ♂ N. Holland (type); 1 ♂ without label. — Mus. Hamburg : 2 ♂ Australia (ex Mus. Godeffroy); 4 ♂, 2 ♀ Australia (SCHRADER leg.). — Coll. Froggatt : 1 ♀ Sydney; 1 ♀ N. S. Wales, 4.11.03. — Mus. Stockholm : 1 ♂, 1 ♀ Australia. — Coll. ESSEN-PETERSEN : 3 ♂, 2 ♀ Hornsby, 2.11.12 (TILLYARD leg.).

This species has hitherto been overlooked on account of its great likeness to *australis*, from which it may be separated by the shape of appendages of ♂ and by the colour of abdominal segments and of fore and intermediate tibiae. There are also some small differences between the two species as to the venation of the wings.

H. nigriceps Selys (fig. 184) (plate II, fig. 23).

Bittacus nigriceps SELYS, Ann. Soc. Ent. Belg., XI (Compt. Rend., pp. 77-78) (1867-1868).

Harpobittacus nigriceps GERSTACKER, Mittheil. naturw. Verein Neuvorp. und Rügen, XVI, p. 119 (1885).

Bittacus intermedius (♂) SELYS, *loc. cit.*

Head black, the rostrum at the apex faintly brownish. Labial and maxillary palpi black. Antennae black; the two basal joints large; the 2nd the shortest and nearly globular. Prothorax and the front half of mesothorax dorsally black; the hind part of mesothorax together with metathorax dorsally reddish brown. The sides and the venter of thorax reddish brown. Abdomen

stout, totally black with the exception of the upper appendages of ♂, which are testaceous. The legs yellowish brown, the fore and intermediate tibiae a little darker. The apical three fifths of fore femora, the apical half part of intermediate femora and a broad band at the apex of hind femora black. A narrow band at the base and a broader one at the tip of all the tibiae black. Tarsi black.

Wings and the pterostigma as in *australis*. No apical cross vein to the costal area. Scv between the origin of Rs and Frs. Frs opposite to Fm. Cuv a little before Fm. No Av. 1A

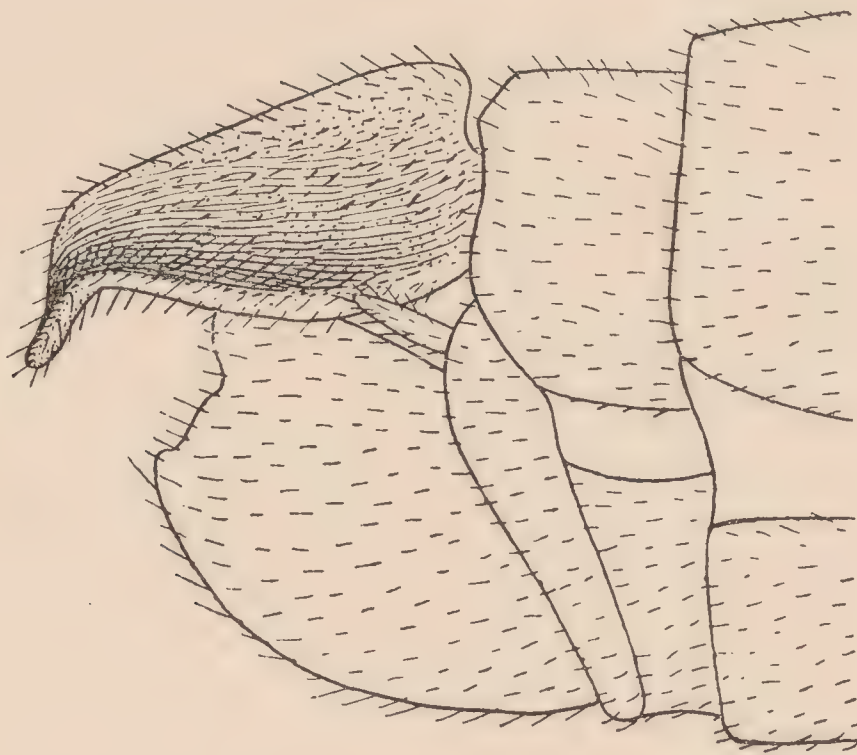


FIG. 184. — *Harpobittacus nigriceps* ♂
Lateral view of anal appendages.
(Coll. Selys).

joins the hind margin a little before Frs and Fm. Bristles on the margins of wings near to the base.

The upper appendages of the ♂, seen from side, broad with straight margins, rounded apex and with a longitudinal median cavity. The claspers, seen from side, with rounded margins and deeply incised at apex.

Forewing : 21^{mm}; hindwing : 19^{mm}5.

Coll. SELYS : 2 ♂, 8 ♀ Queensland.

The species is easily recognized by the absence of Av, by the shape of anal appendages in the male and by the dark colouration of the abdomen.

Genus **KALOBITTACUS** Esben-Petersen.

ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 131 (1914).

In the forewing 1A is very short, hardly half as long as Cu². 2A also short, two thirds of the length of 1A. 3A not present. In the hindwing 1A coalesces with Cu² for its whole length, and it joins the hind margin a little beyond the place, where M and Cu¹ separate. 2A short, one third of the length of 1A. 3A not present. Eyes as far apart in front as the breadth of rostrum at base. Basal joint of hind tarsus a little longer than 2nd and 3rd united, which are equal; 4th two thirds of 1st; 5th a little longer than 3rd.

At first sight this genus is quite similar to *Bittacus*, but the coalescence of Cu² and 1A in the hindwing is a good generic character, only present in *Kalobittacus* and *Pazius*. From the latter it may easily be separated by the broad basal part of the wings and by the larger distance between the eyes.

Habitat : Mexico.

Type : *K. bimaculatus*.

[*K. bimaculatus* Esben-Peters.] (fig. 185, 186).

Kalobittacus bimaculatus ESBEN-PETERSEN, Ent. Medd. Köbenhavn, p. 131 (1914).



FIG. 185. — *Kalobittacus bimaculatus* ♂ type-specimen
(Museum London).

Head, rostrum and maxillary palpi yellowish brown. On vertex a black spot, enclosing the ocelli. Antennae yellowish brown; the two basal joints stout; 2nd joint as stout as 1st, globular. Thorax and abdomen brown. Legs brown; tip of femora, tibiae and of tarsal joints brownish black; hind femora rather stout-built,

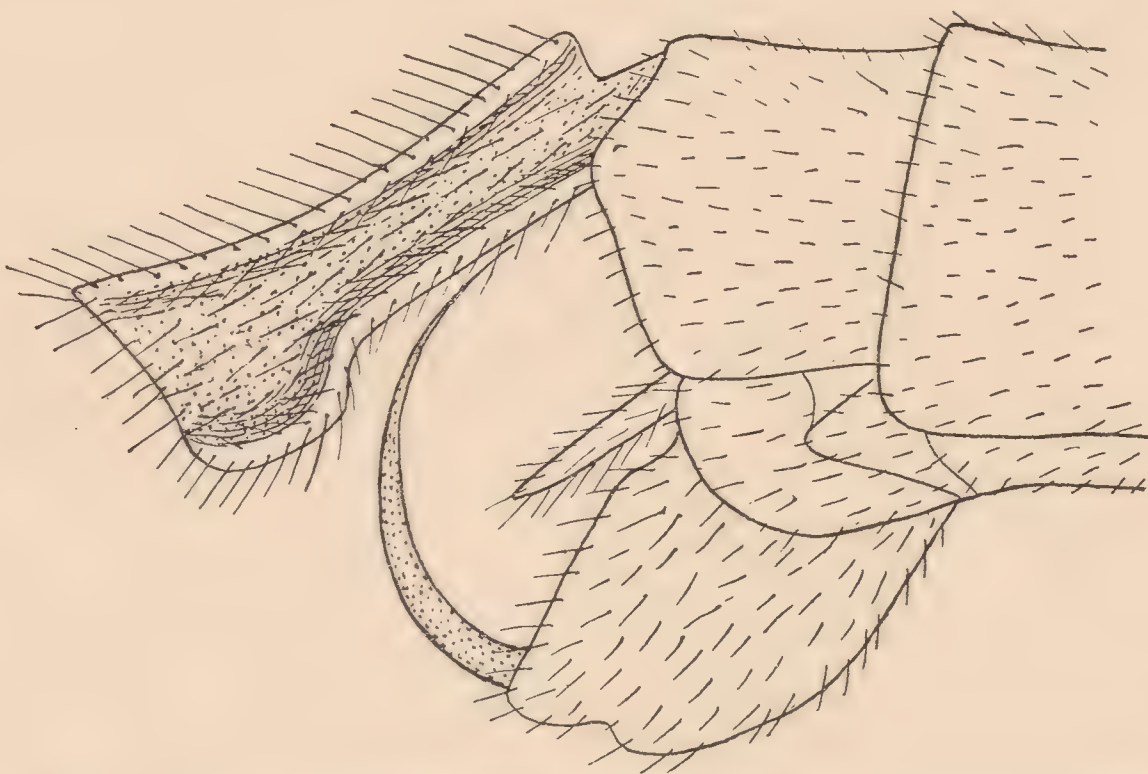


FIG. 186. — *Kalobittacus bimaculatus* ♂ type-specimen
Lateral view of anal appendages
(Museum London).

incrassate in the middle. Wings rather slender and with elliptical apex. Membrane shining and with yellowish tinge; venation brownish. Pterostigma one and a half times as long as broad, strongly brownish black coloured; the colouration passes beyond R; two Pcv. A brownish black spot at the extreme tip of wings. No apical cross veins in the costal area. Scv between the origin of Rs and Frs. Frs opposite to Fm. Cuv a little before Fm. Av present in the forewing, placed near the tip of 1A. Bristles on the margins of wings near the base.

Length of body : 14^{mm}; forewing : 14^{mm}; hindwing : 13^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♂ Teapa, Tabasco, Mexico (H. H. SMITH leg.).

Genus **PAZIUS** Navás.

Pazius NAVÁS, Broteria, Ser. Zool., XI, p. 45, fig. 8a, (1913).

Eyes large, touching each other below the antennae. Vertex raised. Wings long and slender, very narrow in the basal fourth. In the forewing 1A is very short and joins the hind margin before the place, where M and Cu' separate; in the hindwing 1A fuses with Cu² for its

whole length, and it joins the hind margin almost as far from base as in the forewing. $2A$ is free and distinct in the forewing, but in the hindwing it coalesces basally with the hind margin. Basal joint of hind tarsi long, longer than 2nd and 3rd united, which are equal; 4th half as long as the 1st; 5th shorter than 4th. It is a very distinct genus. In the forewing Cu^2 and $1A$ are running close to each other, but a very narrow membraneous space is left. In the hindwing, however, Cu^2 and $1A$ coalesce for the whole length of $1A$, and at some distance from base the coalescing veins are running so close to the hind margin that the terminating of $1A$ in the posterior margin is visible only when greatly magnified.

Type : *P. gracilis* NAV.

[*P. gracilis* Navás] (fig. 187, 188).

Bittacus gracilis NAVÁS, Mem. Real Acad. Cienc. Art. Barcelona, p. 413, fig. 15 (1908).

Fazius gracilis NAVÁS, Broteria, Serie Zool., XI, p. 45, fig. 8a (1913).

Head and rostrum brown; rostrum yellowish at base. Maxillary palpi dark brown. Antennae brown; the two basal joints stout and yellow. Thorax castaneous above. Sides castaneous with two oblique yellowish

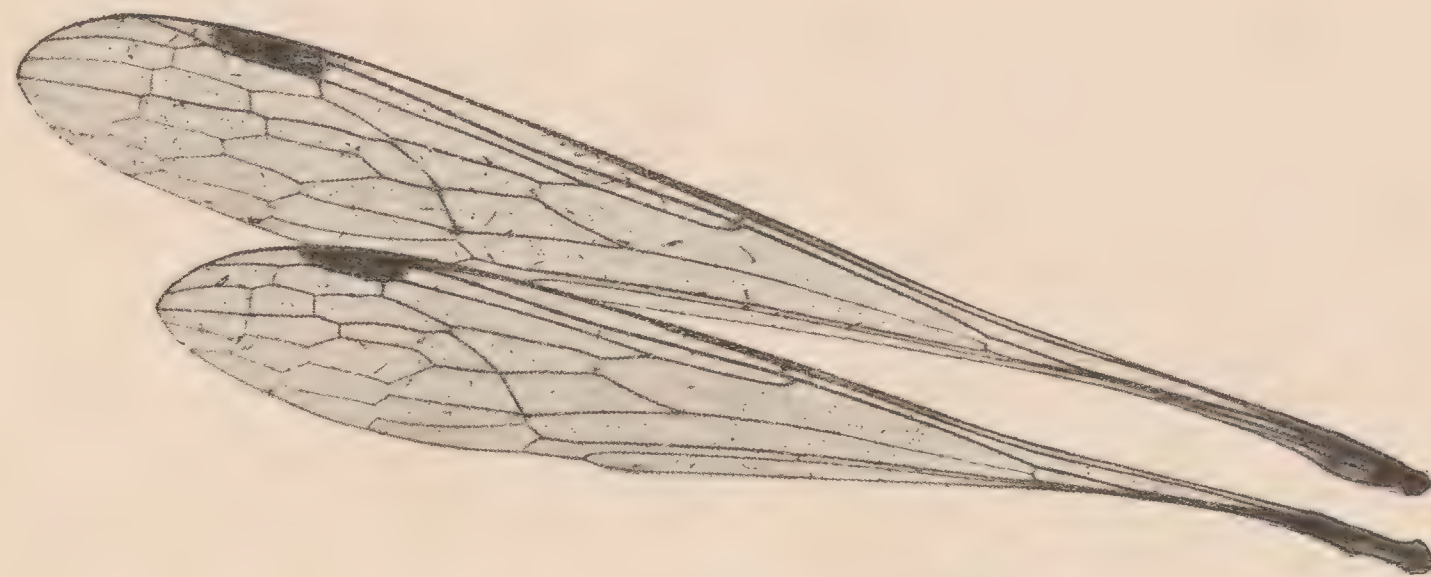


FIG. 187. — *Pazius gracilis* ♂
(Museum London).

streaks. Abdomen brown; the hind border of the segments narrowly blackish brown; terminal segment darker. Femora cylindrical brown; brownish black in their apical third part; the blackish space divided by a

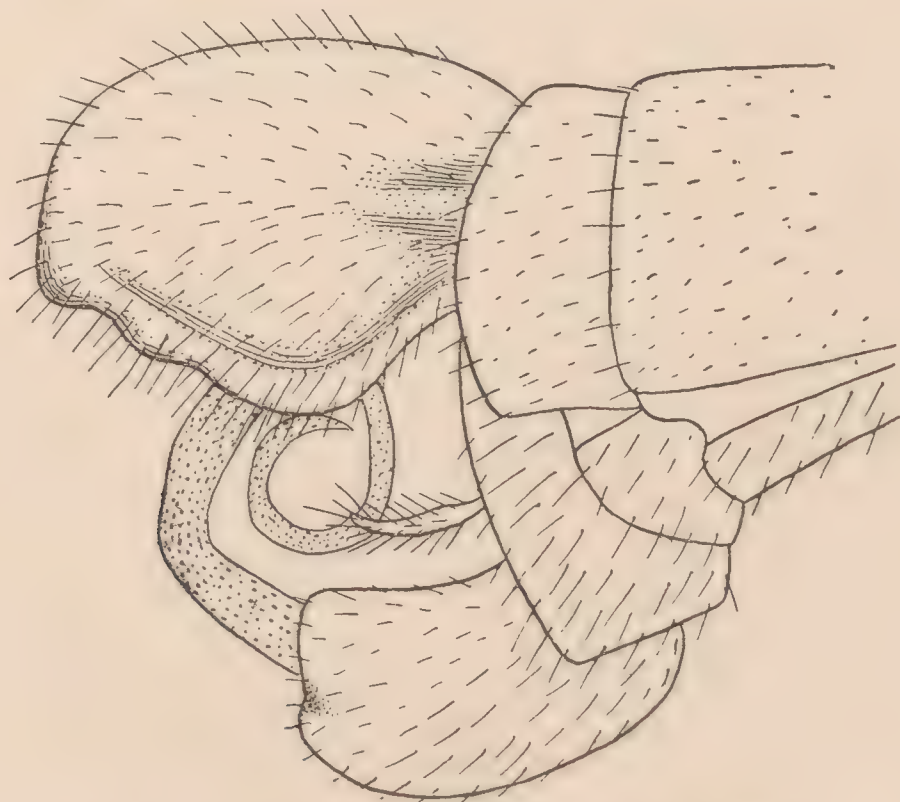


FIG. 188. — *Pazius gracilis* ♂
Lateral view of anal appendages
(Museum London).

broad, clear yellowish band. Tibiae brown becoming brownish black towards apex; the extreme tip with a broad, clear yellowish band. Fore tarsi yellowish brown; intermediate and hind tarsi blackish brown.

Wings long and slender, very narrowed in their basal fourth and with elliptical apex. Membrane iridescent, with faint yellowish tinge and with brown venation. Pterostigma four times longer than broad, rectangular, distinctly dark brown coloured; the colouration pass beyond R. Two Pcv. No apical cross vein in the costal area. Scv in the forewing at the origin of Rs, in the hindwing a little before. Fm before Frs. Cuv before the origin of Rs. The fork of M and of Rs very acute at base. No bristles on the margins of the wings.

In the ♂ the upper appendages, seen from side, are very broad; their lower margin inferiorly with acute dents. In the ♀ the terminal segments, especially the 7th, very incrassate.

Length of body: 23^{mm}; forewing : 18^{mm}; hindwing : 16^{mm}.

Coll. SELYS : not present. — Brit. Mus. : 1 ♂, 1 ♀ Bugaba, 800-1,500 ft (CHAMPION leg.).

Genus **APTEROBITTACUS** Mac Lachlan.

Apterobittacus MAC LACHLAN, Ent. Nachr., XIX, p. 317 (1893). — HINE, Journ. Columb. Hortic. Soc., XIII, p. 108 (1898). — ENDERLEIN, Zool. Anz., XXXV, p. 398 (1910). — BANKS, Trans. Am. Ent. Soc., XXXIX, p. 231 (1913).

Both sexes wingless. The three thoracic segments nearly equal. Legs stout. 1st basal joint of hind tarsi as long as the 2nd and 3rd united, longer than 4th. The claw on hind tarsi slender, long and strongly jointed. The subgenital plate in the ♀ short, rounded at the tip.

Type : *A. apterus* MAC LACHLAN.

[**Apt. apterus** Mac Lachl.].

Bittacus apterus MAC LACHLAN, Ent. Monthl. Mag., VIII, p. 100 (1871) (California). — OSTEN-SACKEN, Wien. Ent. Zeitschr., I, p. 123 (1882). — HINE, Journ. Columb. Hortic. Soc., XIII, p. 110 (1898). — ID., Bull. Sc. Lab. Denison Univ., XI, p. 257 (1901). — BANKS, Cat. Neur. Ins. U. S., p. 34 (1907).

Apterobittacus apterus MAC LACHLAN, Ent. Nachr., XIX, p. 317 (1893).

Head pale brown. Antennae brown, short; the two basal joints stout. Thorax and abdomen brown; the anterior and posterior margin of prothorax with black spines, placed on small tubercles. Abdomen clothed with very fine yellowish grey pubescence. Legs paler than the body; apex of hind tibiae and of the hind tarsal joints darker. Upper appendages, seen from side, slightly concave with superior distal angle produced, distal margin truncate, inferior distal angle prominent, inferior margin slightly concave to basal third, from thence oblique to the base. The claspers, seen from side, with superior and inferior margin nearly parallel and with rounded apex.

Length of body : 21-22^{mm}.

Coll. SELYS : not present. — Coll. ESBEN-PETERSEN : 1 ♀ California (ex coll. BANKS).

ERRATA

Pag. 52, Fig. 55, read Ventral view instead of Dorsal view.

— 53, — 57, — —

— 54, — 58, — —

— 56, — 64, — —

— 85, 11 lines from bottom, read **Ritsemae** instead of **Ritsemai**.

SYSTEMATIC LIST

(The names of the species not represented in Selys' Collection are placed between [].
The asterisk indicates that the Type is in the said collection).

	Page		Page
Familia : PANORPIDAE	11	[striata] Miyaké	38
Subfamilia : PANORPINAE	11	[hakusanensis] Miyaké	39
Panorpa Linné	13	Preyeri Mac Lachlan	39
communis Linné	14	[bicornuta] Mac Lachlan	41
nigrirostris Mac Lachlan	16	[leucoptera] Uhler	42
[rufostigma] Westwood	17	japonica Thunberg	43
[hybrida] Mac Lachlan	18	nipponensis Navás	45
[clavigera] Klapálek	19	ochraceopennis Miyaké	46
germanica Linné	19	Klugi Mac Lachlan	47
[deceptor] Esben-Petersen	21	[obscura] Miyaké	49
* cognata Rambur	22	trizonata Miyaké	49
* meridionalis Rambur	23	[Lewisi] Mac Lachlan	50
* annexa Mac Lachlan	24	[sachalinensis] Matsumura	51
[Ghilianii] Mac Lachlan	25	[orientalis] Mac Lachlan	51
picta Hagen	26	[approximata] Esben-Petersen	52
* Selysi Esben-Petersen	26	[amurensis] Mac Lachlan	53
* connexa Mac Lachlan	27	[Takenouchii] Miyaké	54
[similis] Esben-Petersen	28	[cornigera] Mac Lachlan	55
[Davidi] Navás	29	[gakaensis] Miyaké	57
[sibirica] Esben-Petersen	30	[Galloisi] Miyaké	57
[stigmalis] Navás	31	[arakavae] Miyaké	58
[concolor] Esben-Petersen	32	rufa Gray	58
[guttata] Navás	32	lugubris Swederus	59
arcuata Navás	33	nuptialis Gerstaecker	60
* alpina Rambur	34	nebulosa Westwood	61
[pura] Klapálek	35	[maculosa] Hagen	62
* caucasica Mac Lachlan	35	[longipennis] Banks	62
[diceras] Mac Lachlan	36	[Banksi] Hine	63
Wormaldi Mac Lachlan	37	[latipennis] Hine	63
multifasciaria Miyaké	38	rufescens Rambur	63
		confusa Westwood	64

	Page		Page
[americana] Swederus	65	[apicalis] Miyaké	93
[subfurcata] Westwood	66	[naevia] Navás	94
venosa Westwood	66	[decorata] Mac Lachlan	95
canadensis Banks	67	*oregonensis Mac Lachlan	96
[signifer] Banks	68	[carolinensis] Banks	96
[carolinensis] Banks	69	Subfamilia : CHORISTINAE	97
[virginica] Banks	70	Chorista Klug	98
[claripennis] Hine	70	[australis] Klug	98
[terminata] Klug	71	ruficeps Newman	99
[punctata] Klug	71	Taeniochorista Esben-Petersen	100
[immaculata] Esben-Petersen	72	[pallida] Esben-Petersen	100
[mexicana] Banks	73	Subfamilia : NANNOCHORISTINAE	101
Neopanorpa Weele	73	Nannochorista Tillyard	102
[angustipennis] Westwood	74	[dipteroïdes] Tillyard	102
[hyalinata] Esben-Petersen	75	[holostigma] Tillyard	103
[Mülleri] Weele	75	[maculipennis] Tillyard	103
[lemniscata] Enderlein	76	[eboraca] Tillyard	104
[cingulata] Enderlein	76	Choristella Tillyard	104
[Sauteri] Esben-Petersen	76	[Philpotti] Tillyard	104
[formosana] Navás	77	Familia : MEROPIDAE	105
[ophthalmica] Navás	77	Merope Newman	105
[cornuta] Esben-Petersen	79	tuber Newman	105
[zebrata] Esben-Petersen	80	Familia : NOTIOTHAUMIDAE	106
[appendiculata] Westwood	80	Notiothauma Mac Lachlan	106
[flava] Esben-Petersen	81	[Reedi] Mac Lachlan	106
[nipalica] Navás	82	Familia : BOREIDAE	108
[ocellaris] Navás	82	Boreus Latreille	108
[Cavaleriei] Navás	83	hyemalis Linné	109
[Harmandi] Navás	84	[Lokayi] Klapálek	110
[fenestrata] Needham	84	*Westwoodi Hagen	111
[sordida] Needham	85	[Navasi] Pliginsky	111
Leptopanorpa Mac Lachlan	85	[chadzhi-gireji] Pliginsky	112
[Ritsemæ] Mac Lachlan	85	[aktijari] Pliginsky	112
[Sieboldi] Mac Lachlan	86	nivoriundus Fitch	113
[furcata] Hardwicke	86	brumalis Fitch	113
[Charpentieri] Burmeister	87	[californicus] Packard	114
[longicauda] Weele	88	[unicolor] Hine	114
[tubifera] Enderlein	88	Familia : BITTACIDAE	115
[Jacobsoni] Weele	89	Bittacus Latreille	117
javanica Westwood	89	italicus O. F. Müller	117
[pi] Weele	91	Hageni Brauer	119
[effusa] Navás	91		
Panorpodes Mac Lachlan	92		
paradoxa Mac Lachlan	92		

SYSTEMATIC LIST OF THE MECOPTERA

167

	Page		Page
[indicus] Walker	120	[chlorostigma] Mac Lachlan	154
[insularis] Esben-Petersen	120	[Banksi] Esben-Petersen	155
[latipennis] Gerstaecker	121	[mexicanus] Klug	156
sinensis Walker	121	[texanus] Banks	145
[Mastrillii] Navás	123	[occidentis] Walker	145
[laevipes] Navás	124	punctiger Westwood	146
nipponicus Navás	124	[arizonicus] Banks	146
[takaoensis] Miyaké	126	[stigmaterus] Say	147
[marginatus] Miyaké	126	strigosus Hagen	148
[microcercus] Gerstaecker	127	pilicornis Westwood	149
[africanus] Esben-Petersen	128	apicalis Hagen	150
*Selysi Esben-Petersen	128	[geniculatus] Erichson	150
[montanus] Weele	139	[flavescens] Klug	151
[Sjöstedti] Weele	140	[brasiliensis] Klug	152
[Walkeri] Esben-Petersen	140	[femoralis] Klug	152
testaceus Klug	141	chilensis Klug	153
[Schoutedeni] Esben-Petersen	142	Neobittacus Esben-Petersen	154
capensis Klug	143	Blancheti Pictet	155
[Pobeguini] Esben-Petersen	144	Harpobittacus Gerstaecker	156
[Peringueyi] Esben-Petersen	145	australis Gerstaecker	156
[Chevalieri] Esben-Petersen	146	*Tillyardi Esben-Petersen	157
[fumosus] Esben-Petersen	147	*nigriceps Selys	158
nebulosus Klug	148	Kalobittacus Esben-Petersen	159
[Weelei] Esben-Petersen	149	[bimaculatus] Esben-Petersen	160
[oreinus] Navás	150	Pazius Navás	160
[Alluaudi] Navás	150	[gracilis] Navás	161
[Jeanneli] Navás	151	Apterobittacus Mac Lachlan	162
[aequalis] Navás	152	[apterus] Mac Lachlan	162
[discors] Navás	152		
[lineatus] Navás	153		

ALPHABETICAL INDEX

	Page
æqualis	141
affinis (Panorpa)	20, 63
affinis (Bittacus)	151
africanus	128
aktijari	112
alpina	14, 22, 34
Allaudi	140
americana	58, 59, 65
amurensis	36, 53
angustipennis	74, 78
angustipenne	74
annexa	12, 14, 24, 25
apicalis (Panorpa)	20
apicalis (Panorpodes)	93
apicalis (Bittacus)	150
appendiculata	80
approximata	36, 52
Apterobittacus	116, 162
apterus	162
arakavae	36, 58
arcuata	14, 33
arizonicus	146
Ateleptera	109
Aulops	13, 84
australis (Chorista)	98, 99
australis (Harpobittacus).	156, 157, 158
 Banksi (Bittacus)	115, 143, 144, 145
Banksi (Panorpa)	58, 63
bicornuta	36, 39, 41
bimaculatus	159, 160

	Page
Bittacidae	10, 115
Bittacus	59, 109, 116, 117
Blancheti	154, 155
boldyrevi	110, 111
borealis	20, 21
Boreidae	10, 108
Boreus	108, 109, 110, 111, 112
Bouvieri	40
brachypennis	45
brasiliensis	150, 152
brumalis	113
 californicus	114
Campodetecnum	73, 74, 75, 76, 77, 89, 91
canadensis	58, 67
capensis	132, 134
carolinensis (Panorpa)	58, 69
carolinensis (Panorpodes)	96
caucasica	14, 35
Cavaleriei	83
chadzhi-gireji	112
Charpentieri	87
Chevalieri	136
chilensis	153
chlorostigma	132, 142
Chorista	97, 98
Choristella	102, 104
Choristinae	11, 97, 101
chuzenjiensis	50
cingulata	76
cingulatum	76

	Page
claripennis	58, 70
clavigera	13, 19
cognata	13, 22, 24
communis	13, 14
concolor	14, 32
confusa (Panorpa)	58, 64
confusa (Panorpodes)	95
connexa	14, 27, 29
corethrarius	156, 157
cornigera	36, 55, 56, 57
cornuta	79
Davidi	14, 29, 32, 33
debilis	63
deceptor	13, 21
decorata	95
dentata	45
diceras	14, 36
diffinis	14
Diplostigma	117, 122, 123
dipteroïdes	102, 103, 104
discors	141
Drouarti	47, 49
dyscola	43, 44, 45, 47
eboraca	104
effusa	91
effusum	91
Estenalla	13, 33
Euphania	98, 101
Eusthenia	101
falcatum	75
fasciata	58, 59, 65, 67, 68
femoralis	152
fenestrata	23, 24, 84
flava	81
flavescens	151
formosana	77
formosanum	77
fulvicaudaria	57

	Page
fumosus	137
furcata	86
Galloisi	36, 55, 57
geniculatus	150
germanica	13, 19, 21, 22
Ghilianii	14, 25
gibberosa	20, 21
gigas	109, 110
gokaensis	36, 56
gracilis	161
Gryllus	109
guttata	14, 32, 33
Hageni (Bittacus)	119
Hageni (Panorpa)	43, 45
hakusanensis	36, 39
Haplodictyus	117, 126, 135, 136
Harmandi	84
Harpobittacus	114, 128, 132, 156
hiemalis	109, 110
Himanturella	85, 87, 88
holostigma	103
hyalinata	75
hybrida	13, 18
hyemalis	108, 109
immaculata	13, 72
indicus	120
insularis	120
intermedius	156, 157, 158
interrupta	43, 45
irregularis	43, 45
italica	117
italicus	117, 119, 144, 152
Jacobsoni	89
japonica	36, 43, 44, 47, 49, 57, 60
javanica	89, 90
javanicum	89
Jeanelli	140

	Page
Kalobittacus	116, 159
Klugi	13, 36, 45, 46, 47
laevipes	124, 125
latipennis (Bittacus)	121
latipennis (Panorpa)	58, 63
lemniscata	76
lemniscatum	76
Leptobittacus	117
Leptopanorpa	12, 82, 85, 86, 88, 89, 91, 92
leucoptera	36, 39, 40, 42
leucothyria	42, 43, 44, 45
Lewisi	13, 36, 50
limbata	95
lineatus	142
linguata	92
Lokayi	110
longicauda	88
longipennis	58, 62
lugubris	58, 59, 60
luteola	98, 99
macrogaster	42, 43, 45, 51
maculata	45
maculipennis	103
maculosa	58, 61, 62, 63
magnicauda	41
major	39
marginatus	126
Mastrillii	123
Mecaptera	19
Mecoptera	9, 101, 106
melania	51
meridionalis	14, 23, 24, 25
Merope	105
Meropidae	10, 105
mexicana	73
mexicanus	144, 147
microcercus	127
montana	20
montanus	129, 130, 133, 140
moschinus	135
Mülleri	75
multifasciaria	36, 38

	Page
naevia	93, 94
Nannochorista	102
Nannochoristinae	11, 101
Navasi	111, 112
nebulosa	58, 61, 62
nebulosus	138
negus	139
nematogaster	87
Neobittacus	116, 154
Neopanorpa	12, 73, 74, 75, 79, 80, 81, 85, 87
nigra	45, 46
nigriceps	158
nigrirostris	13, 16
nikkoënsis	42
nipalica	82
niphonensis	43
nipponensis	36, 45, 46
nipponicus	124, 125
nivoriundus	113
notata	95
Notiothauma	106
Notiothaumidae	10, 106
nuptialis	58, 60
obscura	36, 49
occidentis	145
ocellaris	82
ochracea	47
ochraceopennis	36, 46
ophthalmica	77
ophthalmicum	77
oregonensis	96
oreinus	140
orientalis	36, 51, 53
pallida	100
pallidipennis	147
Panorpa	12, 13, 26, 80, 82, 83, 85, 86, 87, 89, 91, 94, 95, 99, 109, 134
Panorpatea	9
Panorpidea	10, 11, 45
Panorpinae	11, 101
Panorpodes	12, 92, 95, 96, 102
paradoxa	92

	Page
Pazius	116, 160
Peringueyi	135
Philpotti	104
pi	91
picea	45, 46
picta	14, 16, 25
pilicornis	149
Pobeguini	135
polemicus	126
Preyeri	36, 39
proboscideus	109
pulchra	43, 45
punctata	13, 71
punctiger	146
pura	14, 35
quadrimaculata	45
quaternipunctatus	121
rectifasciata	43, 45
Reedi	106
Ritsemae	85
rufa	58
rufostigma	13, 17
rufescens	58, 63
ruficeps	99
sachalinensis	36, 51
Sauteri	76
Schoutedeni	133
scorpio	59, 60
Selysi (Bittacus)	128
Selysi (Panorpa)	14, 26
sibirica	14, 30
Sieboldi	86
signifer	58, 68
similis	14, 28
sinanoensis	43
sinense	121
sinensis	121, 122, 123
singularis	95

	Page
Sjöstedti	130
sordida	85
spectabilis	101
stigmalis	14, 31
stigmaterus	146, 147
stigmatica	92
strategus	121, 122, 123
striata	36, 38
strigosus	148
subfurcata	58, 66
suffusa	82
Taeniochorista	97, 100
takaoensis	126
Takenouchii	37, 54
Tarnanii	110
terminata	13, 71
testaceus	132, 133, 139, 144
texanus	145
Thyridates	117, 153, 154
Tillyardi	157
tipularia	117
tipularius	117
tipuloides	118
trisignata	47, 49
trizonata	37, 49
tuber	105
tubifera	88, 89
unicolor	114
Valignanii	45, 46
variabilis	34
venosa	58, 66
virginica	58, 69, 70
Walkeri	131
Weelei	138, 139
Westwoodi	110, 111
Wormaldi	36, 37
zebrata	80

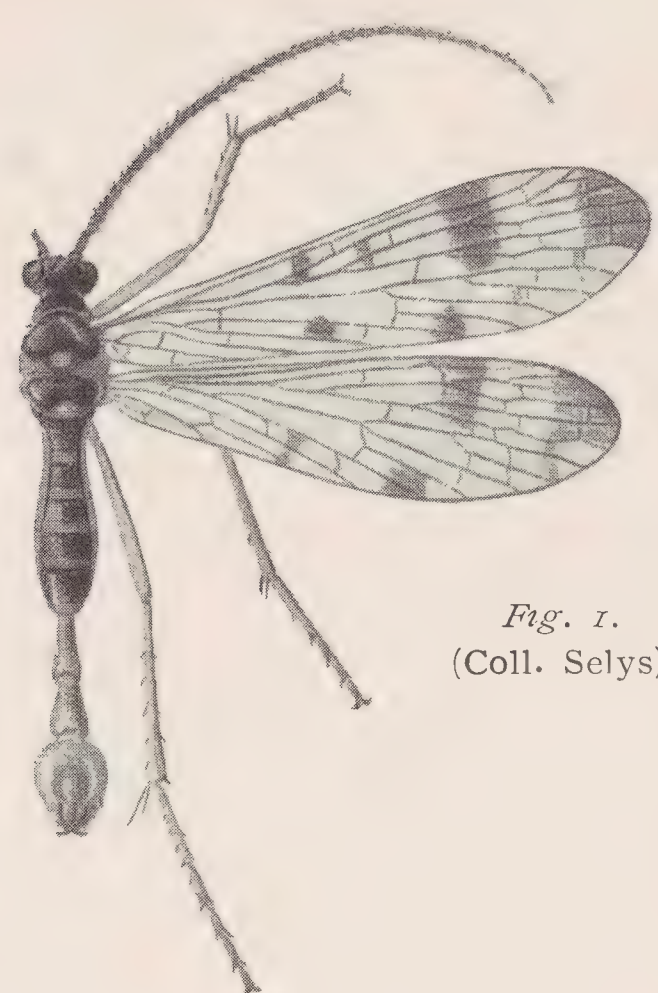


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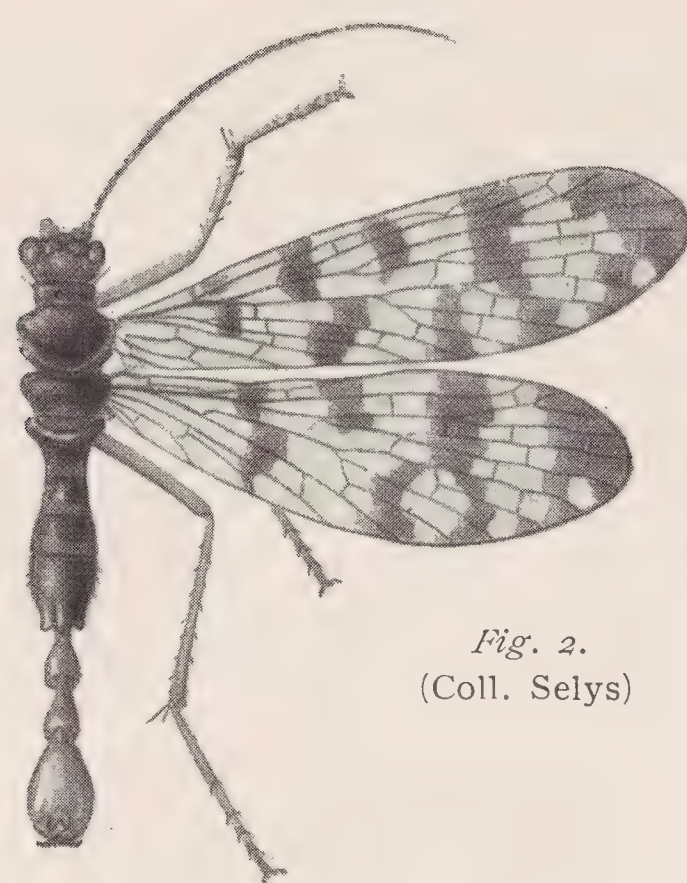


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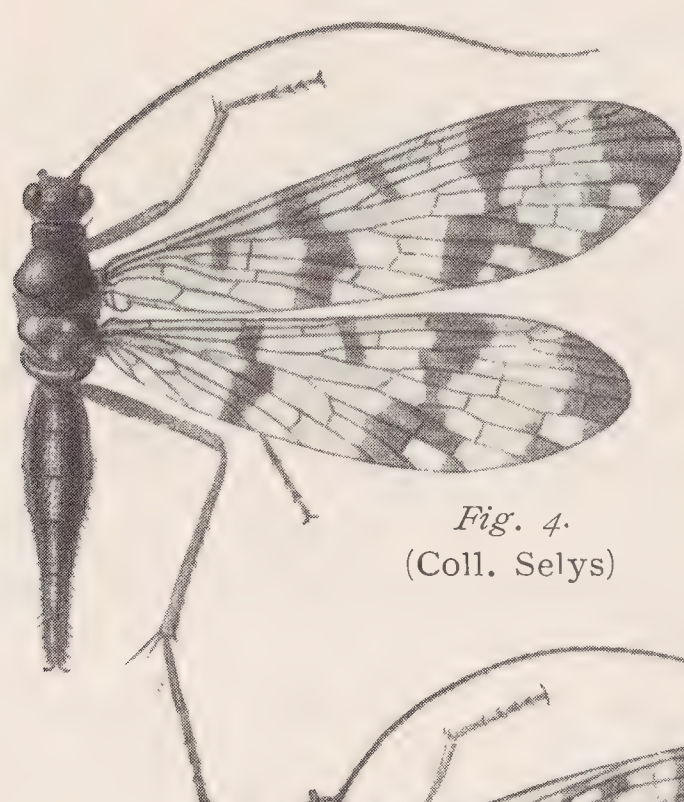


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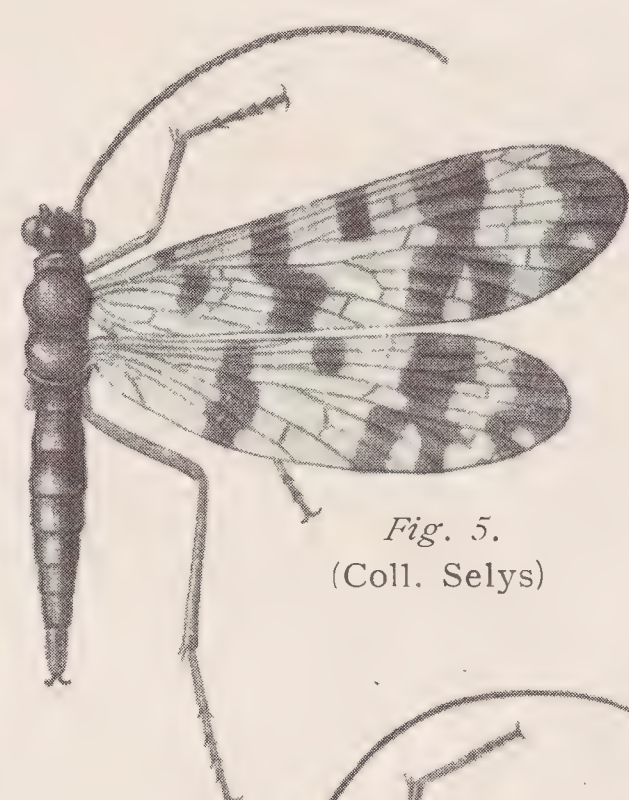


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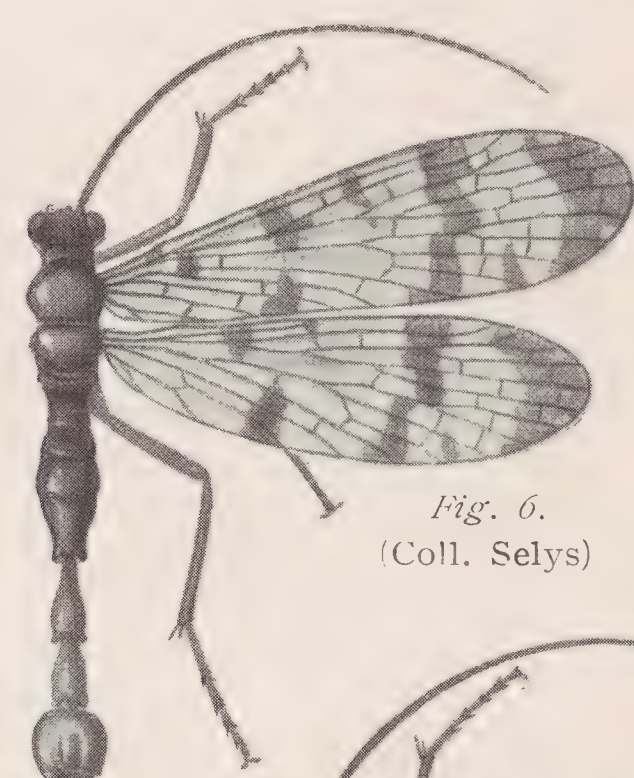


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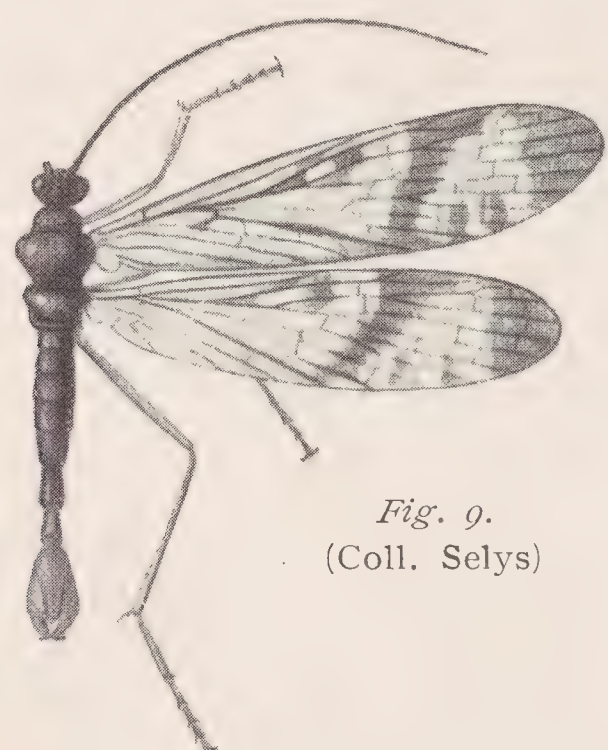


Fig. 9.
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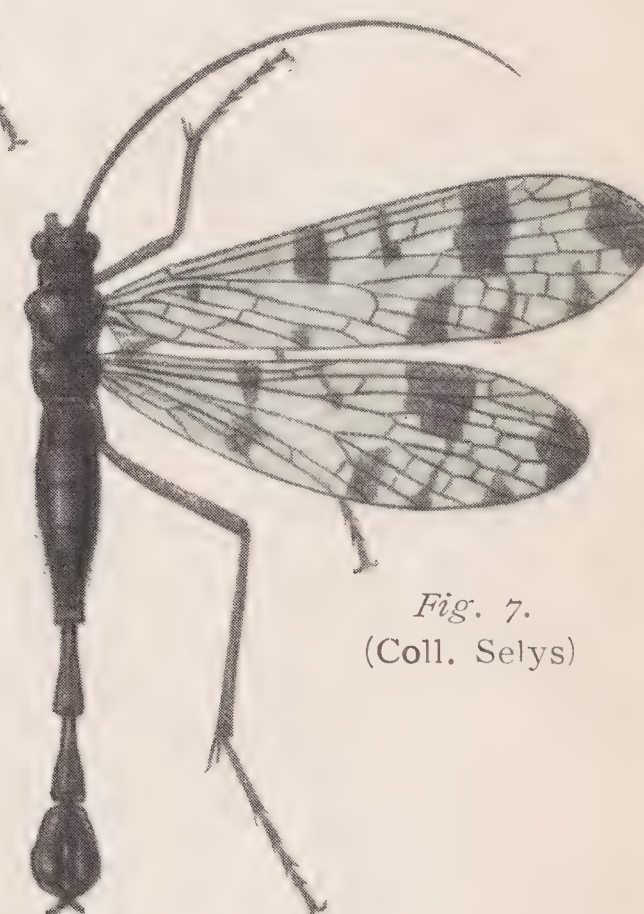


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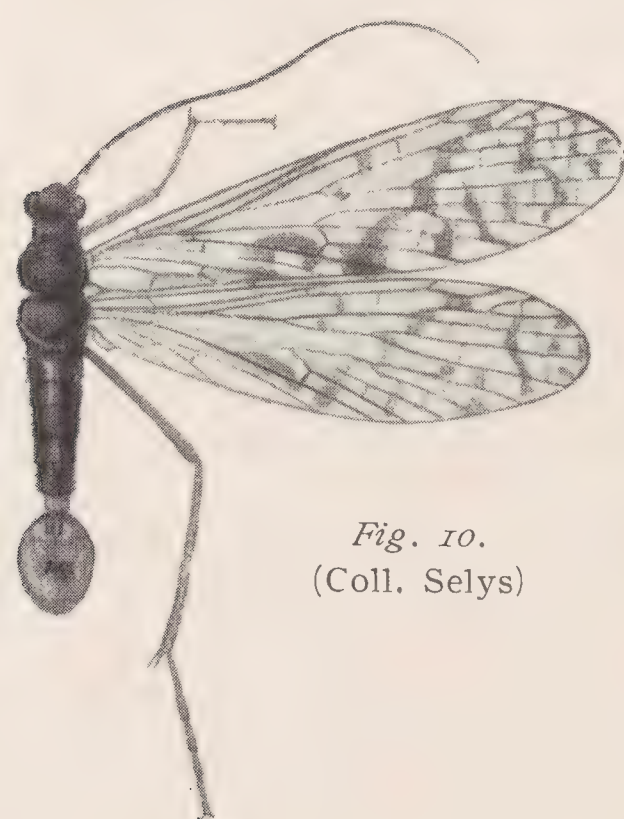


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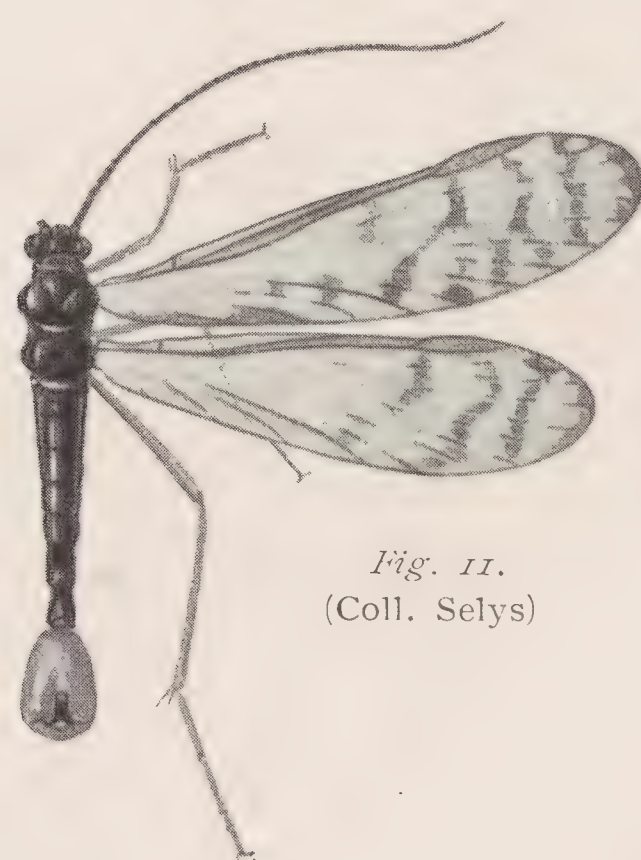


Fig. 11.
(Coll. Selys)



Fig. 12.
(Coll. Selys)

Fig. 1. *Panorpa connexa* MAC LACHLAN

Fig. 2. *Panorpa meridionalis* RAMBUR

Fig. 3. *Panorpa picta* HAGEN

Fig. 4. *Panorpa nigrirostris* MAC LACHLAN

Fig. 5. *Panorpa Selysi* ESSEN-PETERSEN

Fig. 6. *Panorpa rufescens* RAMBUR

Fig. 7. *Panorpa caucasica* MAC LACHLAN

Fig. 8. *Panorpa Klugi* MAC LACHLAN

Fig. 9. *Panorpa Preyeri* MAC LACHLAN

Fig. 10. *Panorpa multifasciaria* MIYAKÉ

Fig. 11. *Panorpa Wormaldi* MAC LACHLAN

Fig. 12. *Panorpa arcuata* NAVAS

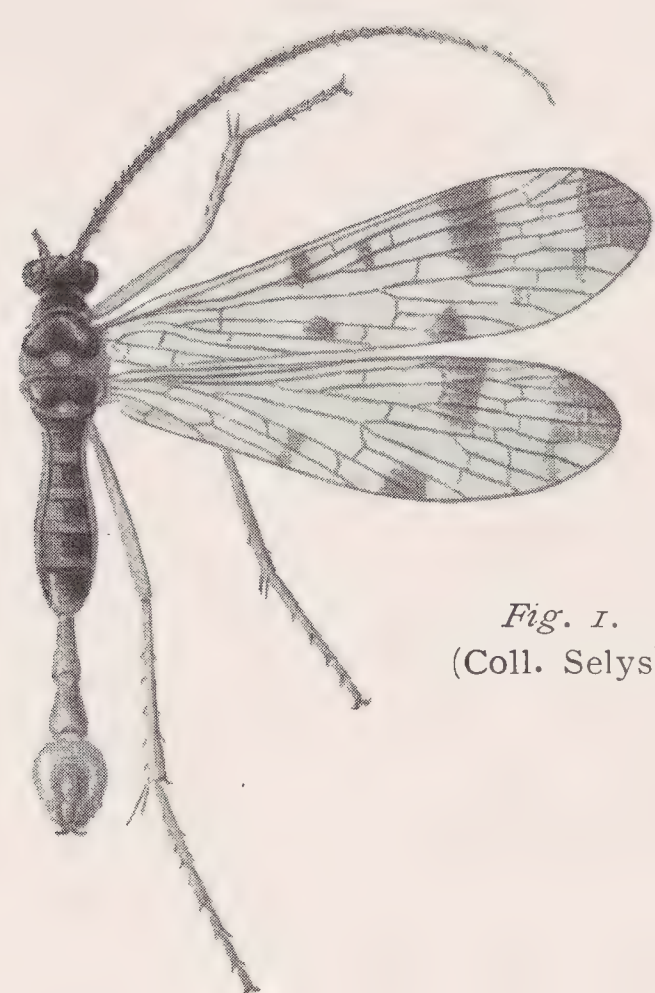


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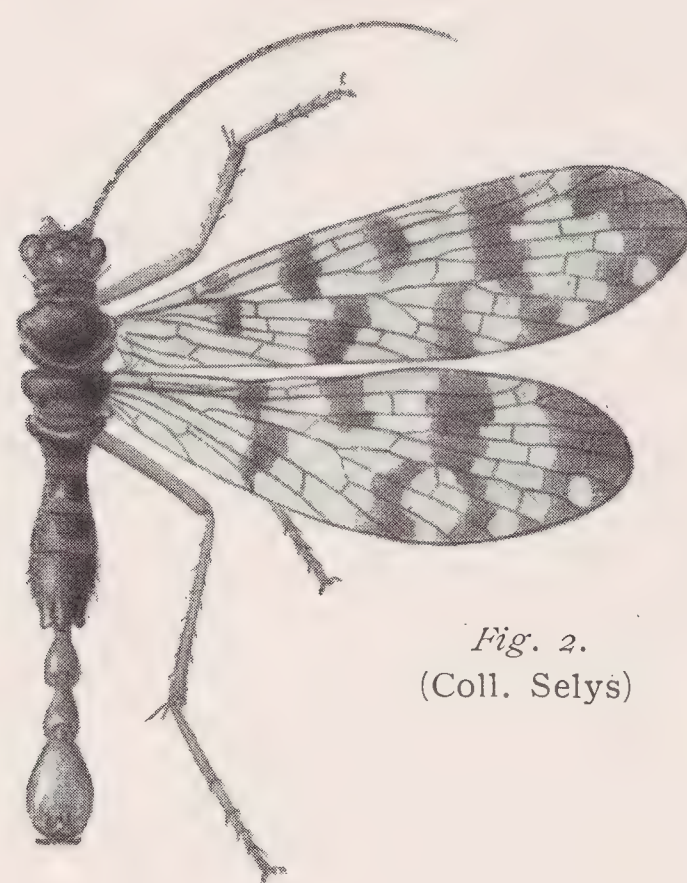


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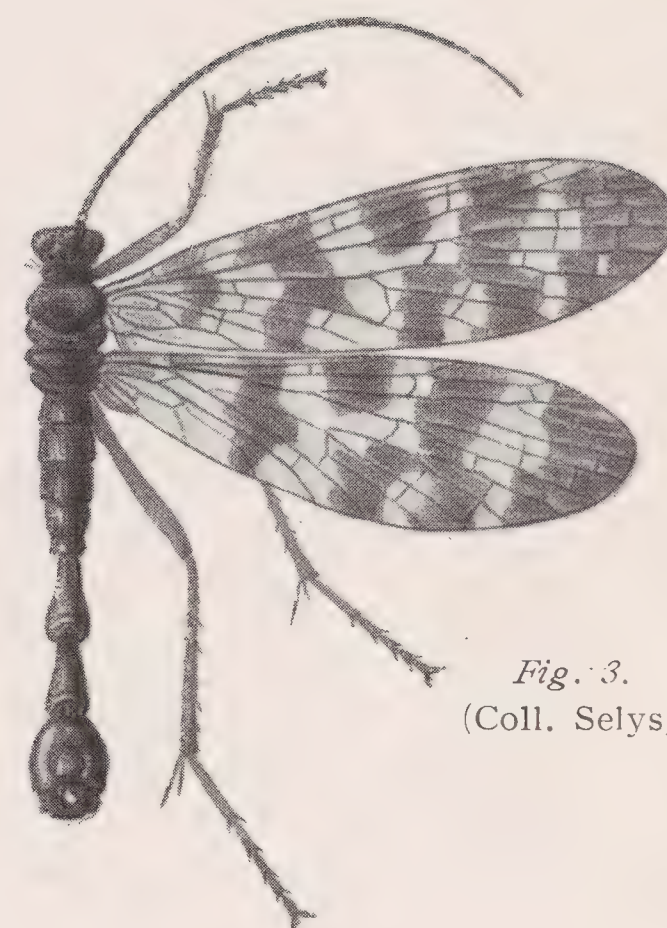


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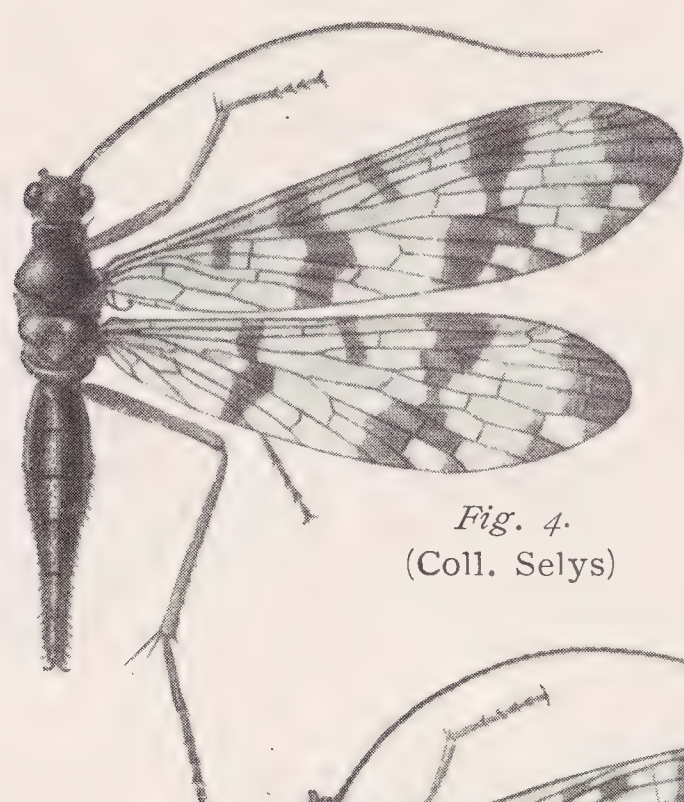


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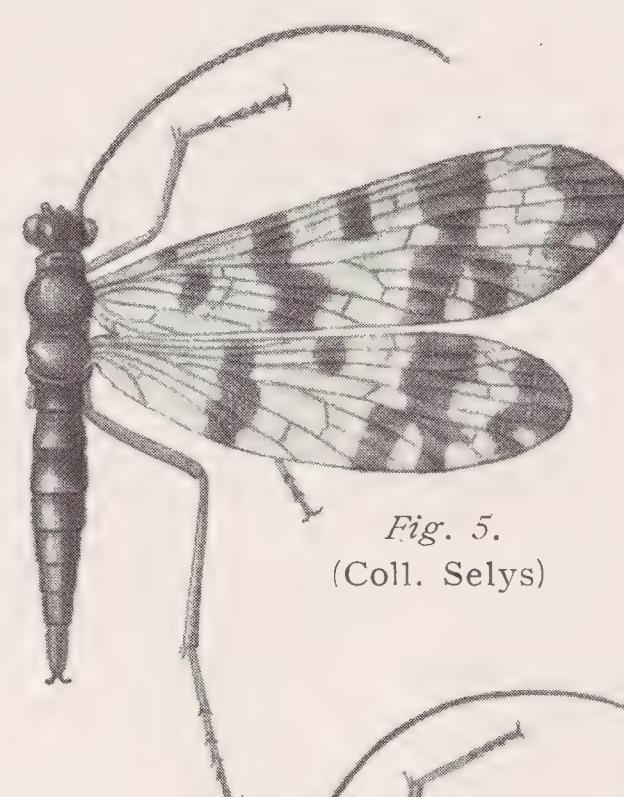


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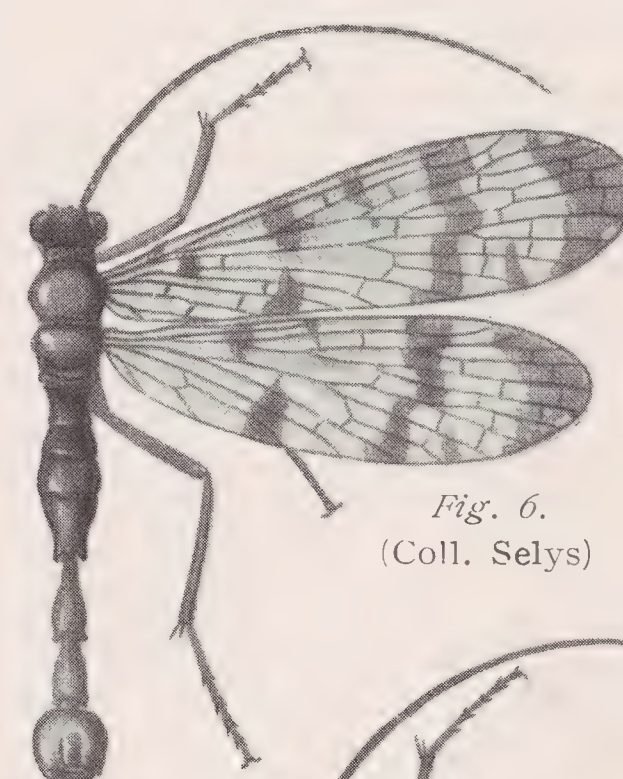


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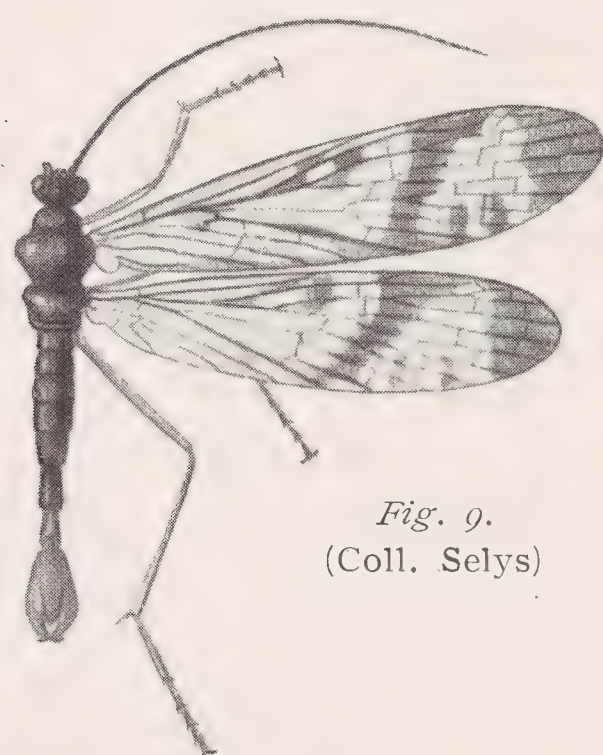


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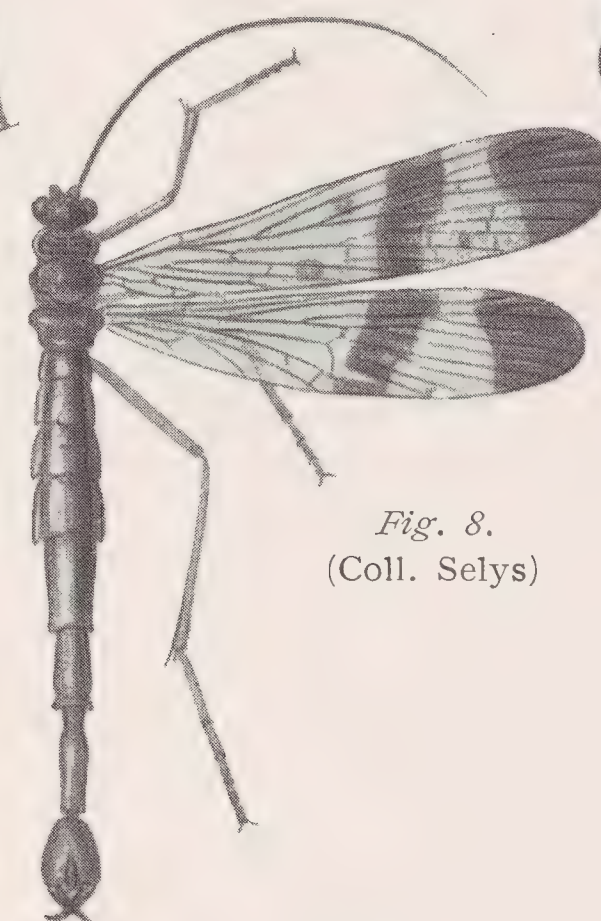


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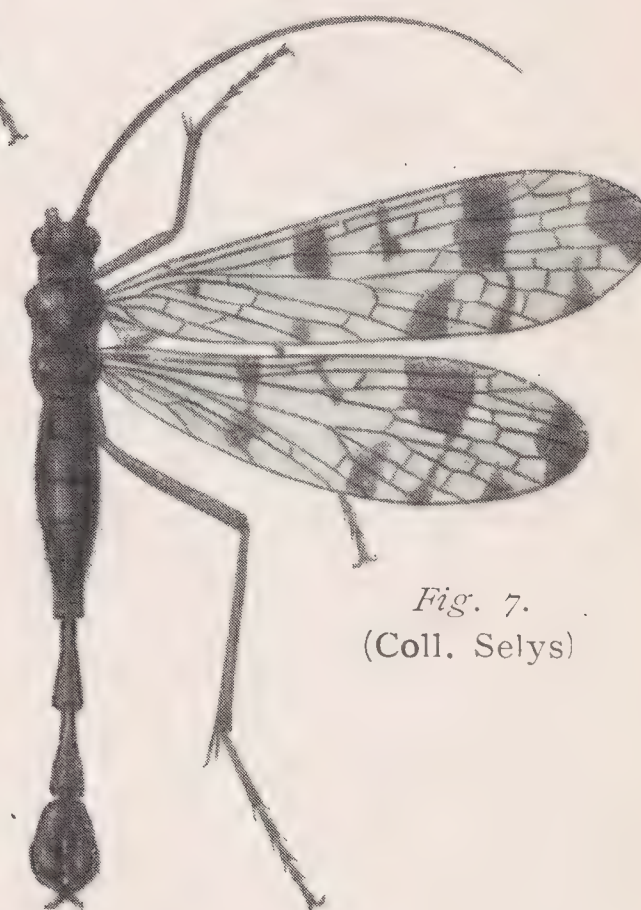


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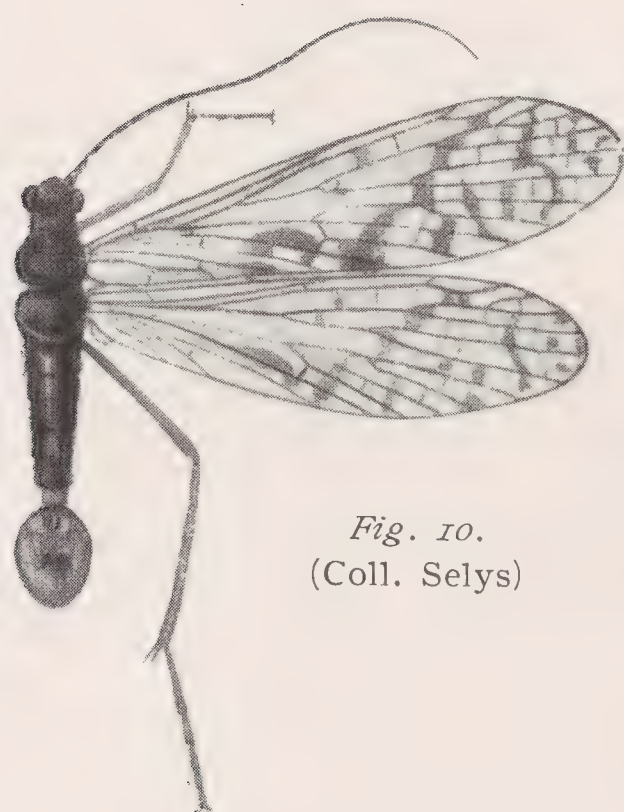


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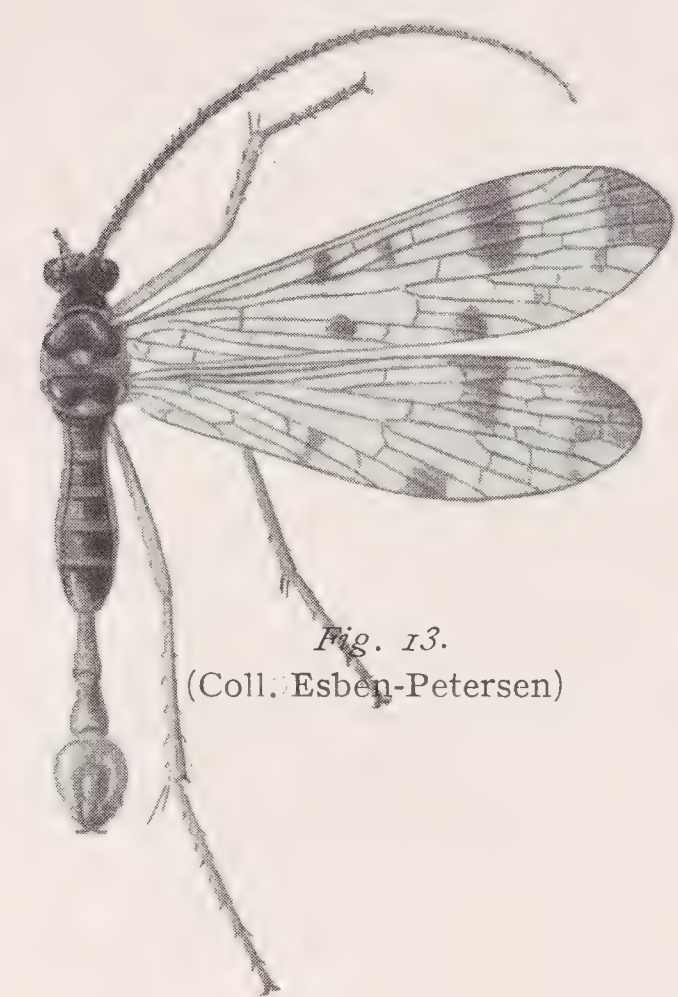


Fig. 13.
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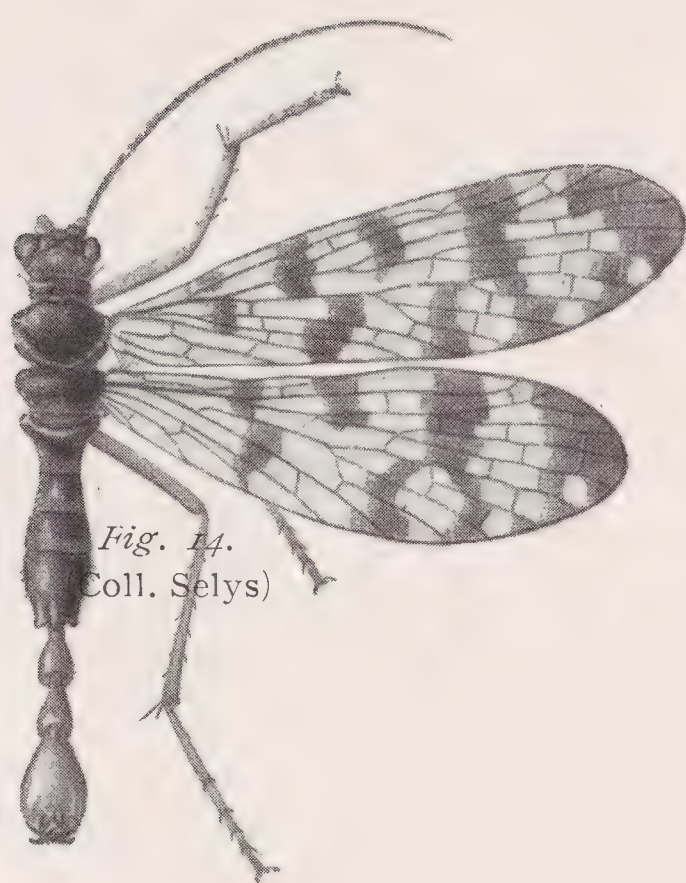


Fig. 14.
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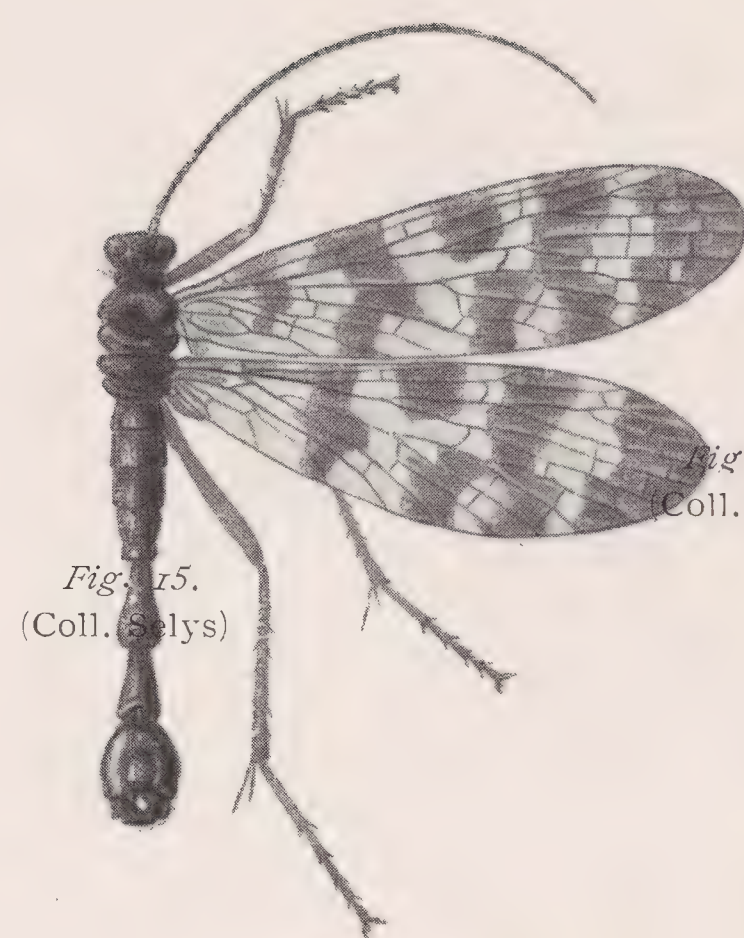


Fig. 15.
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Fig. 18.
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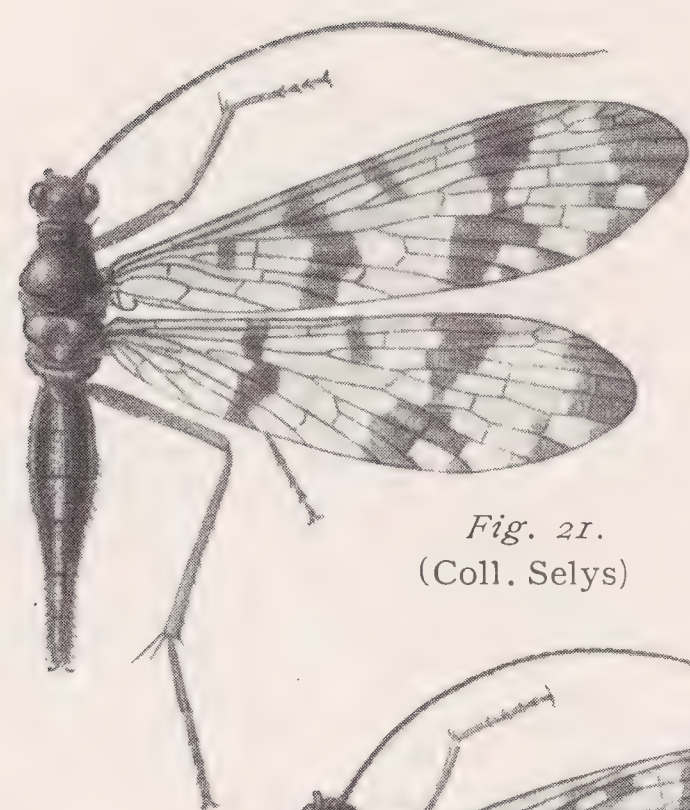


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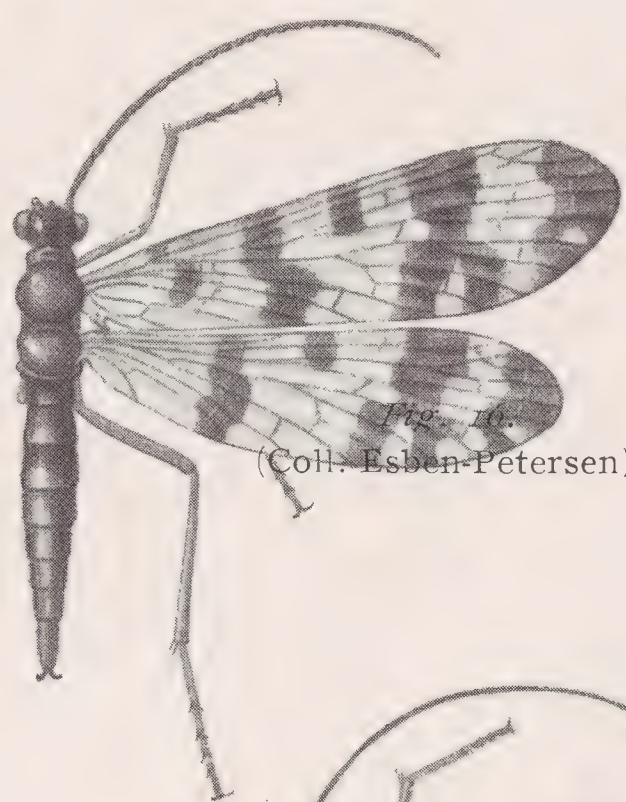


Fig. 16.
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Fig. 22.
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Fig. 23.
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Fig. 17.
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Fig. 19.
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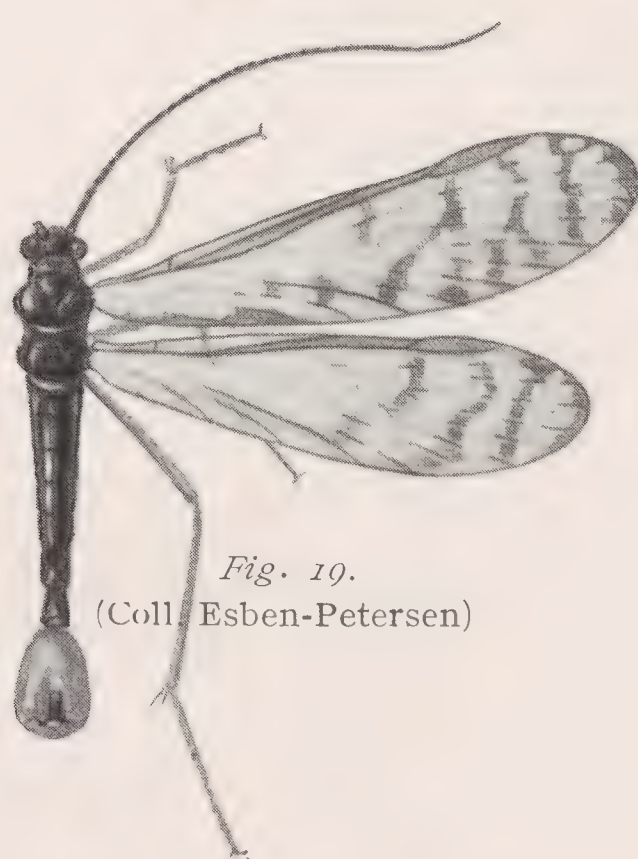


Fig. 20.
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Fig. 13. *Neopanorpa Sauteri* ESSEN-PETERSEN

Fig. 14. *Panorpa rufa* GRAY

Fig. 15. *Panorpa lugubris* SWEDERUS

Fig. 16. *Leptopanorpa longicauda* WEELE

Fig. 17. *Chorista ruficeps* NEWMAN

Fig. 18. *Panorpodes paradoxa* MAC LACHLAN

Fig. 19. *Taeniochorista pallida* ESSEN-PETERSEN

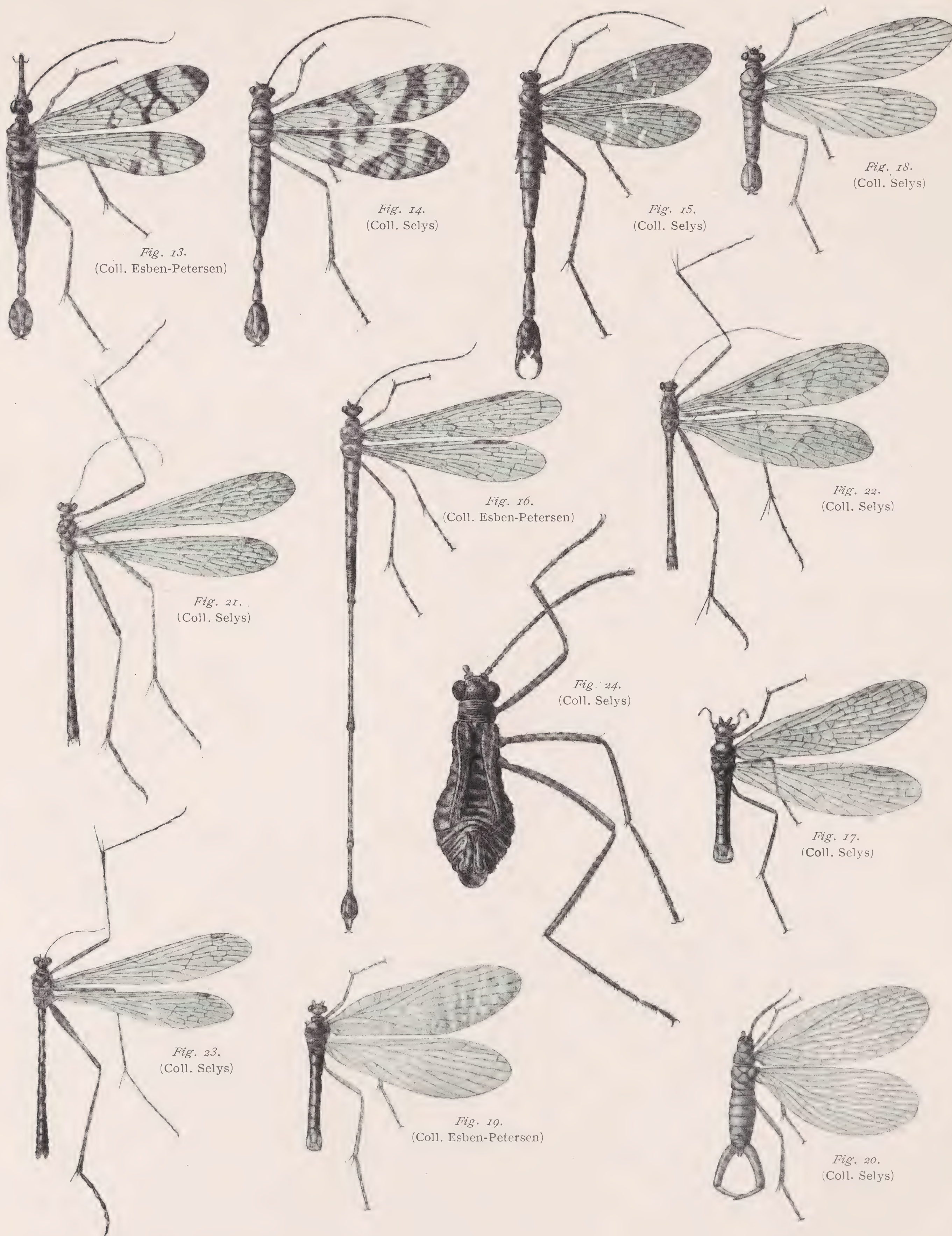
Fig. 20. *Merope tuber* NEWMAN

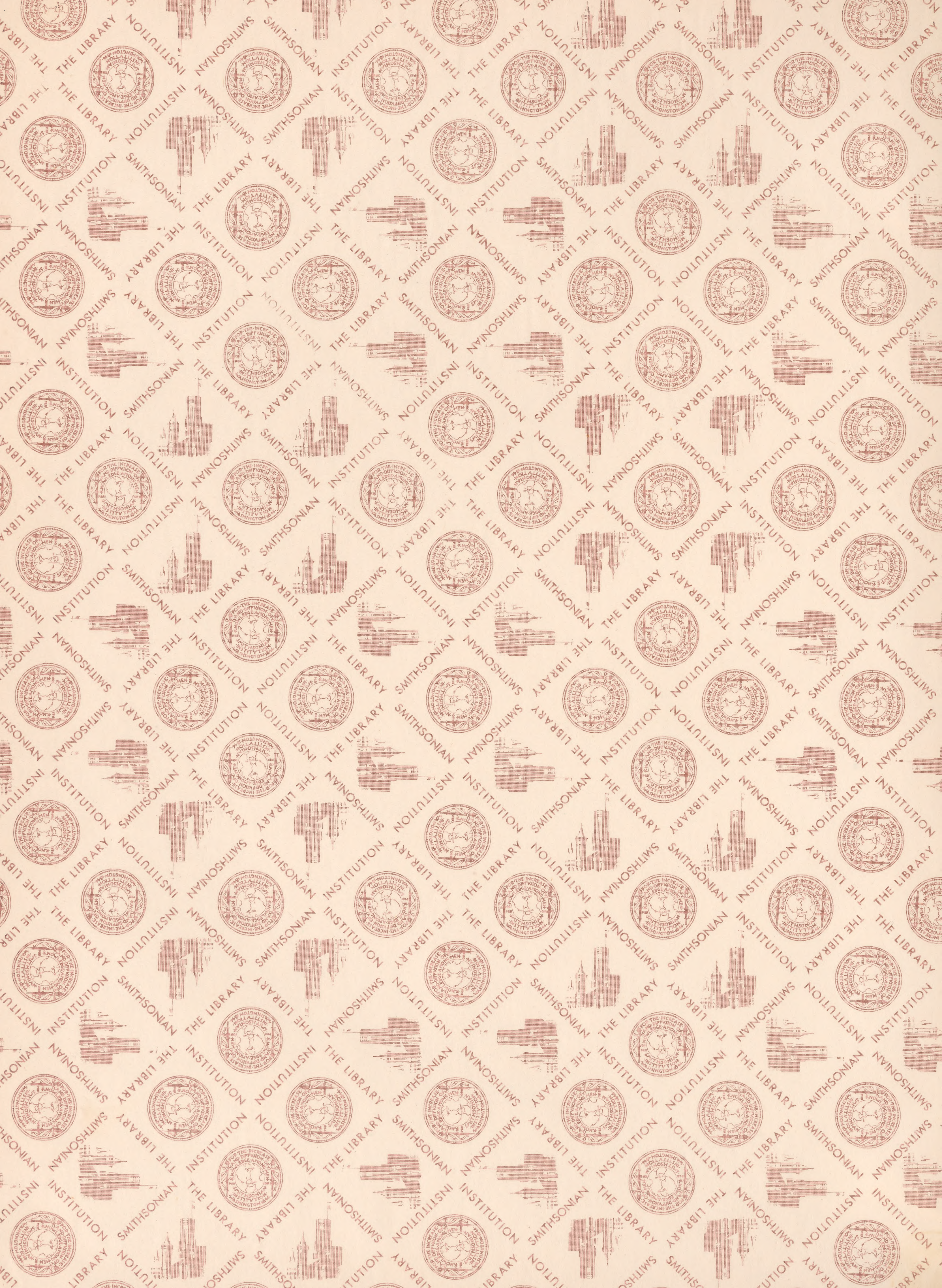
Fig. 21. *Bittacus Selysi* ESSEN-PETERSEN

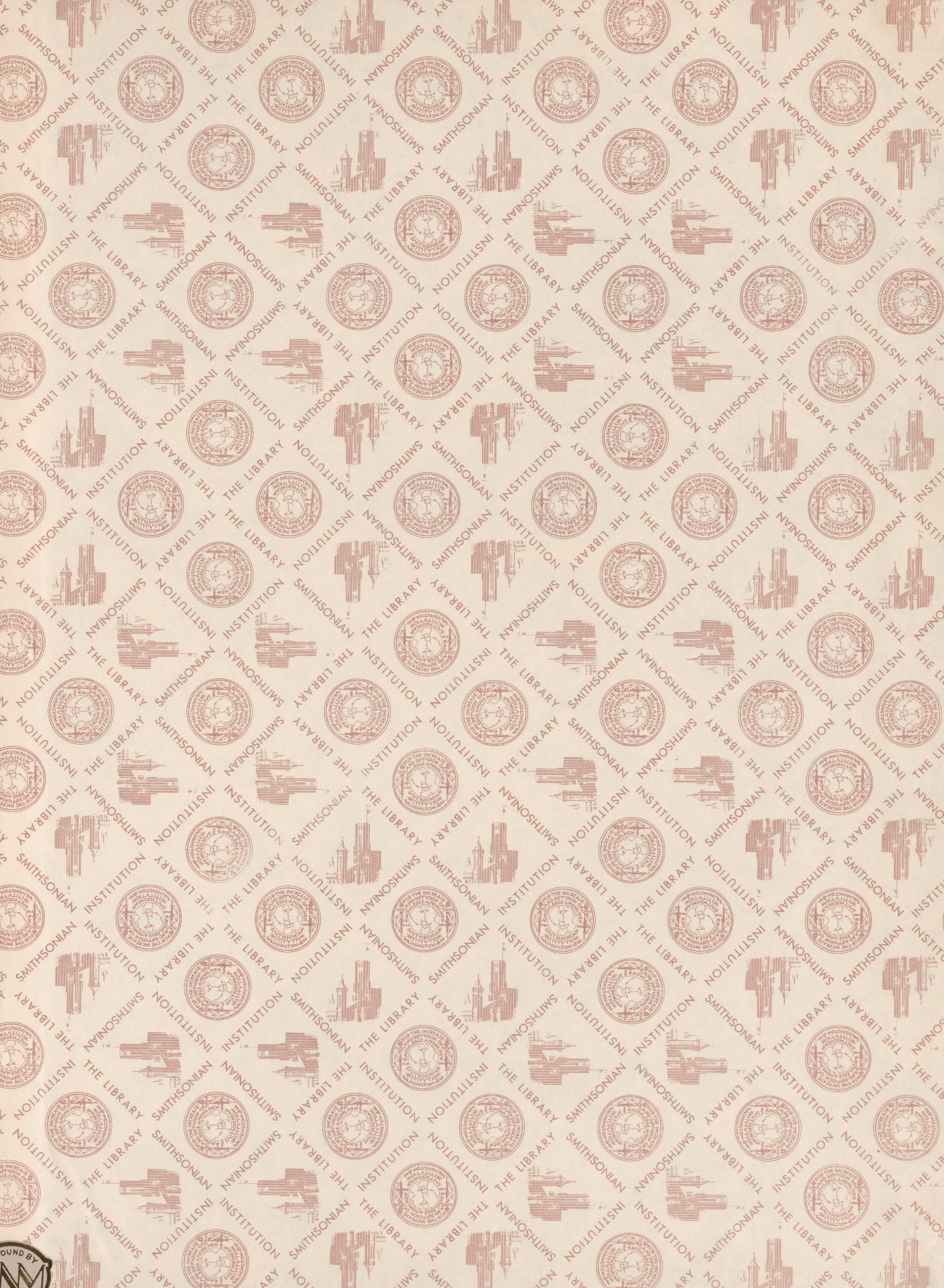
Fig. 22. *Bittacus chilensis* KLUG

Fig. 23. *Harpobittacus nigriceps* SELYS

Fig. 24. *Boreus brumalis* FITCH

Fig. 13. *Neopanorpa Sauteri* ESSEN-PETERSENFig. 14. *Panorpa rufa* GRAYFig. 15. *Panorpa lugubris* SWEDERUSFig. 16. *Leptopanorpa longicauda* WEELEFig. 17. *Chorista ruficeps* NEWMANFig. 18. *Panorpodes paradoxa* MAC LACHLANFig. 19. *Taeniochorista pallida* ESSEN-PETERSENFig. 20. *Merope tuber* NEWMANFig. 21. *Bittacus Selysi* ESSEN-PETERSENFig. 22. *Bittacus chilensis* KLUGFig. 23. *Harpobittacus nigriceps* SELYSFig. 24. *Boreus brumalis* FITCH





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